Vol. XVII
No. 2

INDUSTRIAL-ARTS MAGAZINE

February,
1928

Incorporating: HANDICRAFT and the ARTS AND CRAFTS MAGAZINE

Published Monthly by
THE BRUCE PUBLISHING CO.
354-364 MILWAUKEE STREET
MILWAUKEE, WIS.

Eastern Office:
50 CHURCH STREET
NEW YORK, N. Y.

Western Office:
53 W. JACKSON BLVD.
CHICAGO, ILL.

TABLE OF CONTENTS

Some Phases of the Psychology of Drawing as a High School Subject 41
R. R. Scott
Industrial Arts vs. Smith-Hughes Education 44
Walter L. Collins
Commercializing the Industrial Arts 46
Percy S. Hawkins
The Teaching Content and Objective Testing in Home Mechanics 47
L. V. Newkirk and G. D. Stoddard
The Study of Antiques in School 50
Herman Hjorth

EDITORIALS: Emphasis on the Art of Teaching—Orderliness—Copied Culture —The Worker and His Education—Hand Minded—Life is Like That 52
Correlating Shop and Academic Subjects in the Junior High School 54
T. P. Fiske
Prevailing on Boys to Read and Understand Instruction Sheets 55
J. W. Bollinger
Preserving the Craftsman's Pride 56
Edwin Stodola

SUPPLEMENTS:

A Bench Grinder ..... Nos. 83 and 84
R. F. Davis

PROBLEMS AND PROJECTS:

German and Italian Renaissance Chairs 58
R. Forkel
The Garage as a Carpentry Project 60
H. H. Braucher
A Job Sheet for the Upholstering Class—Tin-Can Hassock 61
Herbert Bast
Design and Application of Moldings 62
L. F. Hyatt
A Bench Grinder 63
R. F. Davis
A Tray-Top Table 65
Margaret Fullerton
A Gear Puller 65
George F. Johnson
A Small Table 67
W. W. White
A and B Battery Charger 67
E. A. Rerucha
Sewing or Bedroom Rocker 69
I. F. Mueller
First-Year Mechanical Drawing True-False Test 70
August Flam
"The Engine Won't Turn Over; the Starter Just Grunts and Quits" 70
Ray F. Kuns
An Instruction Sheet for the Sheet-Metal Shop 71
George A. Todd
A Hint for the Machine-Shop Teacher 72
George C. Donson
Who Named the Monkey Wrench? 72
W. M. Gooch
A Useful Project in Stone Carried Out at Bloomington, Indiana 74
Earl Bullock

Echoes from the Los Angeles A. V. A. Convention 74
Industrial Education in the United States in 1924-1926 76
The Relation of Industry to Education 77
Job Analysis Sheet in West Virginia 77
Association and Convention Activities 78
Now, Are There Any Questions? 80
New Books 28a
Personal News Notes 30a
Publications Received 30a
News and Notes 32a
School Shop Equipment News 36a

EASTERN ARTS— WESTERN ARTS CONVENTIONS

The value of conventions lies in the fact that they afford opportunities for:

a) The exchange of ideas.

b) The making of new and the revival of old acquaintanceships.

c) The re-enkindling of enthusiasms which may have become dampened by the exactions of everyday efforts.

The readers of the INDUSTRIAL-ARTS MAGAZINE *are keenly alive to the values of these get-together movements.*

The next two conventions which claim our attention are:

The EASTERN ARTS ASSOCIATION *convention which will be held April 18 to 21, at Hartford, Conn., and the* WESTERN ARTS ASSOCIATION *convention which will be held May 2 to 5, at Indianapolis, Ind.*

Entered Jan. 2, 1914, as second-class mail matter at Milwaukee, Wis., under Act of March 3, 1879. Copyright, 1928, by Bruce Publishing Co. Title registered as Trade Mark in U. S. Patent Office, Jan. 16, 1917. Member Associated Business Paper and Audit Bureau of Circulation.

Subscription Information—Subscription price, $2.50 per year, payable in advance. Canadian and Mexican postage, 35 cents, foreign countries, 50 cents. Copies not over three months old, 25 cents; more than three months, 50 cents. Notices for discontinuance of subscription must reach Publication Office in Milwaukee, at least fifteen days before date of expiration. Changes of address should invariably include old as well as new address. Complaint of non-receipt of subscribers' copies cannot be honored unless made within fifteen days after date of issue.

Editorial Contributions—The Editors invite contributions bearing upon Industrial-Arts, Education, Manual Training, Art, Domestic Science, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for at regular space rates. In all cases manuscripts should be accompanied by full return postage.

The Magazine is on sale at Brentano's, New York; Wanamaker's, Philadelphia; Brentano's, Chicago.

Service Through Super Construction

The "Star" Lathe has been built to give the greatest amount of trouble-free service that is to be expected of any lathe in the school shop. The Sterling qualities of constant accuracy and stability through years of hard usage are the result of the extreme care of our skilled mechanics in the construction of these machines.

For the proper training of your boys you will find no better Lathe than the "Star." It is being used in laboratories, tool rooms, vocational schools, and in industry and is everywhere accepted as the Standard.

Bulletin on request.

Seneca Falls Machine Co.
Seneca Falls, N. Y.

STAR

STAR LATHES

THE INDUSTRIAL ARTS MAGAZINE

Volume XVII FEBRUARY, 1928 No. 2

SOME PHASES OF THE PSYCHOLOGY OF DRAWING AS A HIGH-SCHOOL SUBJECT

R. R. Scott, Buckhannon, West Virginia

THE DIFFERENT STAGES through which a child passes in the development of his ability to draw, have been subjected to much careful analysis. Sometimes we find the analysis in terms of the child's performance; again in terms of mental processes. Since this paper will not be concerned with products, except as they contribute to an understanding of the mental processes involved, examples of only the second type of analysis will be presented. Prof. G. H. Luquet in his book, "Les Dessins D'un Enfant" offers the following: First stage—involuntary drawing. By this expression he means that the child is unaware that the lines which he sees he can make, can be used to represent objects. The realization of this fact comes to him rather pointedly and then he is able to bring the factor of intention into his drawing. In the words of Luquet, *"les âges suivants ne diffèrent entre eux que par la façon dont s'exprime ce réalisme."*

Second stage—synthetic incapacity. This stage is characterized by inability to put coherency into the various parts of the drawing. The effort of analysis seems to exhaust the child's mental resources so that he cannot put together what he has taken apart.

Third stage—logical realism. The young artist deliberately and consciously reproduces an object religiously representing not only what can be seen, but also what he knows to be there.

Fourth stage—visual realism, the adult stage in which the individual represents what he sees, employing more or less accurately the principle of perspective.

Kerchensteiner and Meuman's Outline

Kerschensteiner and Meuman have given us the following outline whose similarity to the one previously presented will be noted: First stage—preexperimental. The child tries to give vent to his communicative instinct by means of activity which can hardly be called drawing at all. It is simply a form of counting or telling the various elements which should go into the picture being placed side by side.

Second stage—schema. On this level of attainment the individual disregards the laws of solidity and opacity, reproducing what he knows, not what he sees.

Third stage—beginning appreciation of line and form. Real visual reproduction now begins to appear, but the schematic features are still present in some measure. Carrying the analysis further, we have in the fourth stage a representation according to appearance, the drawing being in outline. If the individual advances beyond this, he passes into the fifth stage, in which perspective is used to represent tri-dimensional form.

Psychology of Drawing of the Adult Stage

The foregoing examples are sufficient to show a common type of psychological analysis of developing drawing ability up to the adult stage, which is reached by the high-school age. The literature in this field is rather abundant and it is an interesting and profitable field of investigation. However, if drawing is to continue to be taught above the grammar school, and if we can assume an adequate course of instruction in the grammar school, there would seem to be a need for a psychology of drawing which would begin at the point where the students of children's drawing usually leave off, namely, the so-called adult stage. The involved question is whether we use the same mental processes in improving an art after its fundamental elements have been mastered as we use in mastering the fundamental elements, when the last process is concomitant with the maturing of the mind. If Luquet, Kerschensteiner, and Meuman are correct in their statement that the stage of drawing ability attained by children between ten and twelve is the adult stage, we must perforce conclude that our psychology of high-school drawing will not be a genetic psychology —except in the sense that any improvement in a mental function is a developmental process. Concretely, if the growth of spatial perception is a factor in child drawing psychology, it might be asserted that in the adult stage improvement would take the form of growth in ability to represent on paper the spatial perceptions which are in the mind. That is, improvement would be found more on the performance plane. That would not, however, remove the discussion from the psychological field, for the improvement of motor functions is behavior and, as such, is quite as much amenable to psychological explanation as the inner maturing of mental functions. It now appears that a large part of our psychology of high-school drawing will concern itself with the mental aspects of motor expression. However, we must be clear on the point that not all motor expression is of the habitual sort we find in operating a typewriter or juggling balls. We have now come to the place in our discussion where a psychological analysis of high-school drawing must be attempted, but it seems desirable to first delimit our field of discussion.

Psychology of Different Types of Drawing

Drawing as it is taught in high school may be mechanical drawing, scientific drawing, designing, color work with various mediums, or free-hand sketching. The purposes sought in these various lines are not the same; the materials and tools used are different, and, except in its more general aspects, the psychological explanation will necessarily vary. The discussion will be confined to the psychology of free-hand sketching. The scope of our task must be further narrowed by avoiding consideration of some of the more general aspects just hinted at. For example, the psychology of appreciation, which drawing teachers certainly must reckon with, will not be taken up. The facts of interest as applied to the choice of drawing

subjects and as influencing progress in the art must also be neglected. These are matters which our general educational psychology has dealt with at length and the responsibility for application cannot be lightly evaded by the individual teacher. One further explanatory point and we are ready to proceed with our analysis. Free-hand drawing can be done (1) with a model, (2) without a model. When a model is provided it may be a real object or scene or it may be a picture. When no model is used, the drawing act might be guided by a story or description, or be left under the control of an untrammeled mind. In using a model, the students may be allowed to visualize at will or they may be given a brief exposure or brief exposures and then be asked to draw from memory. The foregoing facts may be shown in outline as follows:

A. *With a model*
   1. Real object or scene
      a) Visualizing at will
      b) Brief exposures
   2. Picture as model
B. *Without a model*
   1. Drawing act guided by story or description
   2. Drawing act unguided

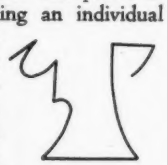
Our analysis will cover, in a more or less cursory way, all the items in the foregoing outline. We may now return to the matter of improvement in motor functions.

Drawing From a Model

When a student of drawing is confronted by a scene or object, his task is to represent what he sees in a way which will be pleasing because it conforms to standards of evaluation which he has built up. In doing this, he is called upon to perform a rather complex series of acts, chief among which are (1) eye movements involved in visualizing the model and in observing the progress made on the paper and, (2) arm, finger, and hand movements. If there is a more effective way to use the eyes in examining a model, we do not know what it is. True, there is evidence that a general examination of the complete model at the outset, and periodically afterward, is an aid to the formation of a true perception of its form, which in the last analysis is simply a perception of spatial relationships as they appear. However, it is known that the eye receives vivid sensations only when it is at rest and we would still have the question of points of fixation, duration of pauses, and direction of movements. Should the eyes travel around the periphery of an object, in radial, vertical, or horizontal movements, etc.? Such questions become more important when our model is a complex one, like a section of outdoors, or an exceedingly large object which must be reduced. Whatever the answers to these queries may be, teachers find it desirable to urge students to carefully observe the form of the object to be drawn; and they often aid the performer by asking such questions as: What is the angle of this side to that? How does this line curve? Where do we find the darker masses? Some artists analyze the form of an object in great detail before beginning work.

In discussing eye movements, it is very difficult to avoid the topic of spatial perception, which is, in fact, the purpose of the eye movements. We shall, therefore, dispose of this matter before taking up the arm, finger, and hand movements.

No one can become a good artist whose spatial perception is faulty. On the other hand, adequate spatial perception will not insure artistic skill, for the performance factor must be reckoned with. That recognition of form is susceptible of improvement can be demonstrated by asking an individual to draw, after a ten-second exposure, a combination of lines like the one shown at the right. His skill in reproduction will improve with a succession of trials; the evidence of continuous improvement will not be found in each drawing. The improvement is going on internally. The writer tried this experiment on a number of college classes and it was brought out that the progress in the mastery of form was aided by certain generalized ideas of procedure, as, for example, counting the number of lines, noting the size and direction of the angles between the lines, etc.[1] This again suggests the value of the teacher's aiding pupils in the perceptual process by asking analytical questions. In an experiment similar to the one mentioned above, Freeman found that instructed learners required a smaller average number of trials to draw the figure and made fewer errors than uninstructed learners. The writer finds that in his own spatial perception when reproduction is intended it helps to seize upon some point or points of reference and mentally measure distances and angles from those. Another helpful device is to take real or imaginary perpendicular and horizontal lines for orientation. The angles of vision in the horizontal and vertical planes made by the eye with the remote points of an object can be roughly measured by closing one eye and sighting with the pencil held at arm's length. This is a good example of the efforts of teachers to help pupils in their spatial judgments. Its limitations are obvious. It cannot be used with a large model close to the eyes and it cannot be used when the subject is a picture or object lying upon one's work table. Furthermore, it often will be necessary to reduce the scale, and the measurements actually taken on the pencil, while they may give an idea of relative sizes, cannot be used on the paper. Finally, this objective aid will have to be discarded sooner or later and it may be relied upon too long for the best interests of the learner.



Drawing Not Only a Perception of Spatial Relations

Before leaving this topic, it should be pointed out that spatial perceptions are not all the visualization necessary in drawing. The individual has to learn to perceive values of shading; he has to cultivate an "eye" for symmetry and balance, which are not altogether matters of space relation, since lights and shadows and the emotional appeal of parts of the ensemble play a prominent part. In this connection let us note that the visual delimitation of the field for representation is a most important factor in artistic ability. This is a type of training which high-school students rarely get, because the model usually prescribed is an object or group of objects. In the latter case the grouping is frequently done by the instructor. Deciding what to draw, how much of the landscape to include, and what to make the center of attraction all require judgments which must be trained if we are to get artistic ability and an artistic response to environment.

We have discussed eye movements, spatial perception, and have mentioned discriminative judgment all in relation to drawing from a real subject. Turning now to the arm, hand, and finger movements, the outstanding apparent fact is that we are not dealing primarily with a series of habitual acts in definite serial relation, but rather with a mode of behavior which is elastic, and which must be in close rapport with a constantly changing visual imagery which guides it. There is small place for motor *drill* in teaching this kind of drawing. We do not mean to imply that there are no constantly recurring motor acts in drawing which should be reduced to habit, but merely wish to imply that those habits are not the dominant modes of motor behavior. Perhaps it would not be desirable to push this point too far. In transferring to paper what exists in the mind as memory imagery, the muscles have, of course, to perform many feats which depend upon practice for their effectiveness. For example, drawing a straight line demands a nice adjustment of muscular and visual coordination which is the same regardless of the context in which that straight line appears. However, it doesn't necessarily follow that the child should be put to drilling on the drawing of straight lines. It seems likely that on the whole, the desired facility in muscular movements in drawing might best be acquired in connection with actual drawing. Under these

[1] Judd, *Psychology of High-School Subjects*, pp. 25-31, and Freeman, *Experimental Education*, pp. 25-31.

circumstances, the mental tone of the student will be the desire to successfully represent what he has in his mind, and any success he experiences with his technic will tend to fix the muscular coordinations attending it. This proscription of analytical drill does not deny the valuable aid which can be secured by providing the learner with ideas of procedure for the improvement of his technic. The writer remembers with gratitude the tremendous impetus which was given his progress in graphic art by a few pertinent suggestions from a teacher relative to the manner of sharpening the pencil and the edge to be used in making strokes for shading. Years of independent effort had failed to bring about the discovery of these simple points through trial and error.

Memory Images

It must have occurred to the reader before this that one's facility in the purely manipulative aspect of drawing will be largely affected by the vividness and tenacity of his memory images. It is at this point that the matter of brief exposures versus visualization at will has a bearing. In the experiment on perception, which was described in the foregoing, the exposures were of ten seconds' duration and were continued as long as necessary. The advantage of this in drawing might be that the student would bring an attitude of concentration to his perceptions, and would learn to see a great deal in a short time, or perhaps a little very accurately. In teaching reading, we use a flash-card system to get speed in perception and extend its scope. Let us note, however, that there is not the same need of speed in pictorial drawing as in reading; and that recognition of form is not needed for some end extraneous to form itself as in reading. Visualization at will is doubtless a more sound method, though it cannot be denied that this will mean in many cases a rapid succession of brief exposures, for individual differences in the tenacity of imagery are great. If that is what it means, it is well, for the individual will tend to adopt the type of visualizing which is best suited to his type of mind. In penmanship, teachers sometimes find that children do not look at the copy enough, but drill on poor forms. This is not likely to happen in drawing for we do not have a drill subject here; the hand must be responsive to a changing mental content.

Reproduction vs. Representation

In high-school drawing it is not likely that much practice need be given in drawing from pictures, though artists often wish to copy originals or make sketches from photographs. The chief psychological point to note in this connection is that the element of discriminative judgment is eliminated. It is like working a problem which somebody else has carefully stated for you. The matter of choosing the subject (or delimiting it), the points of emphasis, the manner of treatment, and the spacing on the paper have all been worked out by the original workman. Copying is the easiest kind of drawing because it makes no demands upon the judgment or imagination. The statement needs to be modified somewhat in the case of making a sketch from a photograph. Good sketching is not reproduction; it is *representation*. True, the main judgment factors are cared for, but the task calls for a degree of skill in representation according to principles of art. The would-be artist must call upon his stock of visual and motor memories which he got through experience in sketching similar items and in observing the good sketches of others.

The remainder of the discussion will concern itself with the psychology of free-hand sketching when no objective model is set before the learner. Of course, it is impossible to draw without a model of some sort, for there must first be an idea of the thing one intends to draw and then a model in the form of memory imagery drawn from one's past perceptions of this thing, or his visual memories of sketches he has formerly made. This kind of model is not as enduring and stable as an objective one. It is clear that the first requisite for drawing without an objective guide is a body of rich visual imagery. It would seem that this stage of performance must wait upon experience. Conversely, it has had more vogue in the lower grades, though it must be admitted that skill in representation is not the aim sought. The teacher generally tries to supply the mental content needed by telling or having the children read a story which they are to illustrate. The ends usually sought are:

1. A deeper understanding of the story (though this is extraneous to drawing);
2. Appreciation of the connection between pictorial art and narrative;
3. Development of originality.

There can be no doubt that the story assists the pupil by building up a body of imagery, provided, of course, the story deals with commonplace things with which the hearers are familiar. Our provision throws us back upon the point that we cannot expect as high a grade of artistic performance in this type of technic as in the use of a model because the imagery which guides the hand is more vague and unstable.

Developing the Illustrating "Eye"

There is a place for this kind of work in the high-school drawing course. An individual trained in drawing should have an "eye" for illustrative material just as a playwright should have an eye for dramatic situations. This is one of the main features in cartooning, for example. Students who have always been provided with clearly defined subjects show a lack of this type of judgment. We say they lack originality. As has been indicated, the imagery used in this kind of drawing must be drawn from past experience, but the images are not necessarily whole images, nor yet concrete images. For example, if the story calls for the representation of a horse, the drawer may not recall the image of any particular horse; his horse image may be a synthetic one built up from previous images of several horses, or it may be a generalized image. It is not necessarily the individual who has seen the most horses, nor yet the one who has most carefully analyzed horses, who will make the best picture; but rather it is the one who has successfully drawn the most horses. The mental processes involved in illustrating a story are the highest types of all involved in the sketching art, for they are real synthesizing and selective memory processes. While we are still on this topic, let us point out that illustrative drawing has this further advantage. The student may be led to see that all pictures are not intended to arouse pleasure. The function of some pictures is to convey an idea or it may be to arouse strong emotions like indignation or hatred or compassion. This is a generalized idea about art which is attainable.

The difference between illustrating a story and drawing from a description is primarily a difference in judgment or the "eye for illustrative material." Here the subjective model is prescribed and more or less completely delimited. Memory is called into play, but it is not the selective type of memory.

The motor aspects of the two situations just discussed are not fundamentally different from those in objective drawing. The chief variations are a slowing up of the various motions and possibly a more dispersive behavior because of the greater haziness of the imagery, and secondly, the confinement of eye movements to the survey of the work on the paper. It will be asked what becomes of spatial perception in which the exploring eye plays so large a part. The artist is now dependent upon the thoroughness with which the exploring eye and the perceiving mind do their work. In fact, one prominent factor in the several-times-mentioned haziness of the subjective model is just this lack of visual aid in perceiving spatial relations. It is the memory rather than the perceptual function which we have to deal with, and if the memory does not present us with clear-cut spatial images, the work will suffer in its proportions. How many people can accurately remember the relative proportion of a man's head to the rest of his body? In attempting to draw from memory, we readily see the lack

of proportion in our sketch and we, therefore, erase and experiment until the thing looks right. In other words, we make a model out of our sketch to correct our images. This is what was meant above by "a more dispersive behavior."

The last section of our outline deals with the situation in which the student has neither model, story, nor description to guide his activities. This introduces no new psychological elements. It simply brings selective judgment to the front. What happens in a case like this is that the child is open to suggestions from any source. His interests are almost certain to dictate his theme. In fact, that is the chief value of this way of handling the work. In commercial drawing or in illustrating a book or story, our themes are more or less clear defined for us and we need to know how to work within those limits. In drawing for pleasure, whether one's own pleasure or another's, the mind is free to consult its interests. Much of our school drawing lacks zest because themes are prescribed which make no appeal to us.

INDUSTRIAL-ARTS VS. SMITH-HUGHES EDUCATION

Walter L. Collins, Cincinnati, Ohio

THE PAST DECADE has witnessed many changes in educational aims and methods but perhaps none has greater significance than the very apparent change which has taken place in our so-called manual activities. The recent and rapid introduction of vocational courses, particularly Smith-Hughes work, has brought about a reconsideration of the whole field of manual activity which makes necessary clear differentiations between the aims and purposes of industrial arts and of vocational education.

To the superficial observer or student of education, these differences are not apparent. To him it is very probable that all activity coming under either head would be thought of as vocational in nature. This is not at all surprising. Snedden in "The Problem of Vocational Education" says: "In the minds of many, who were originally influential in introducing drawing, manual training, household arts, mechanical arts (and other subjects now considered as part of industrial arts), these studies were designed to contribute to vocational efficiency." That they have failed to contribute to any great extent to vocational efficiency is now generally conceded by students of the subject. There have been, however, some schoolmen and educational administrators who have always contended that these subjects have contributed to a liberal education far more effectively than they have to vocational education. Especially, they say, is this true in proportion as the limitations of the home deprive the child of opportunity for experience in the field of constructive and manual activities. Herein, I take it, lies the chief difference between industrial arts and vocational education: that industrial arts is a component part of a liberal education while vocational education can under no circumstances be considered as such.

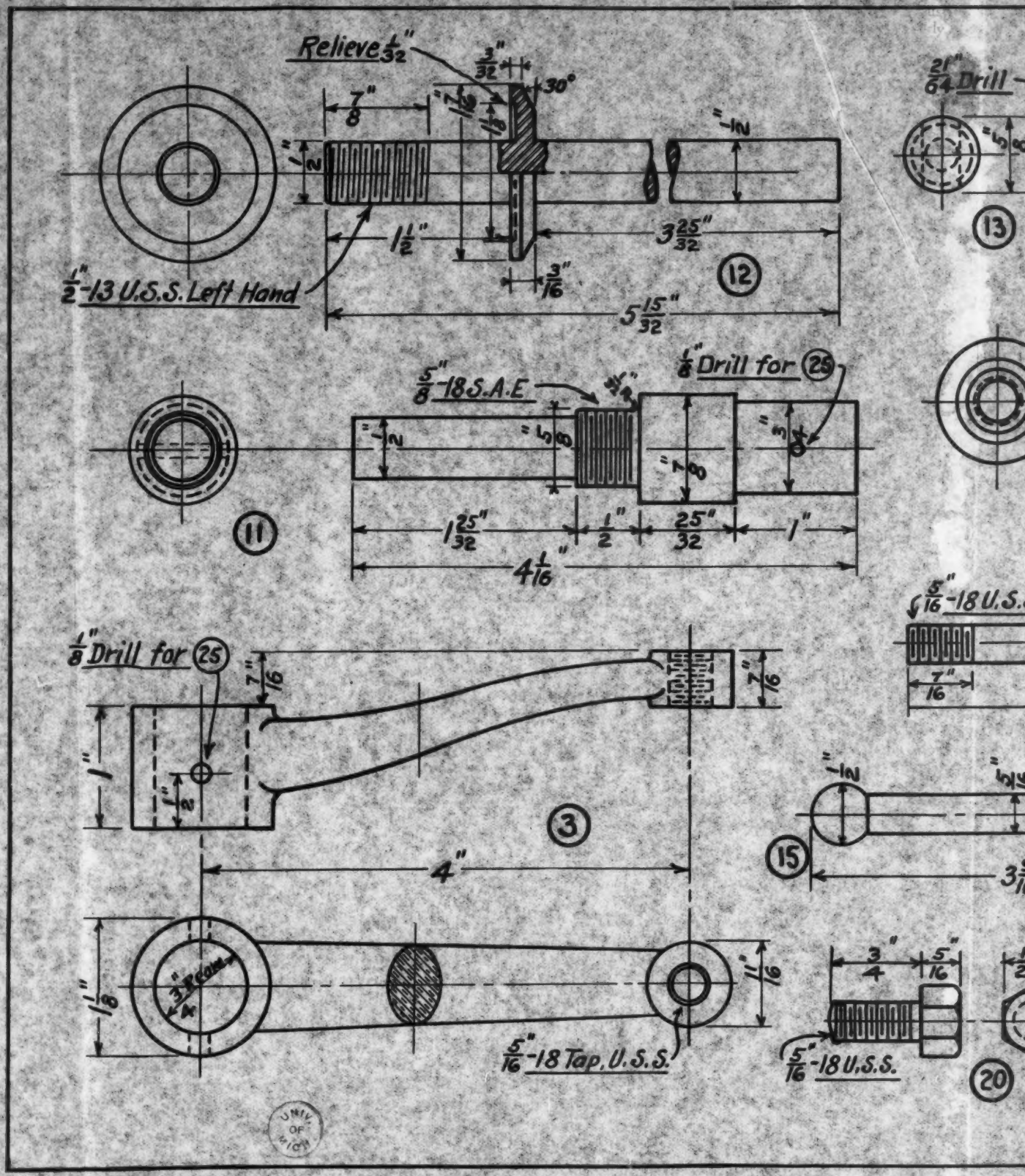
A liberal education has been defined as "that which aims to broaden the intellectual and emotional horizon of the individual, and especially in those fields that are not involved in the earning of a living." Liberal education is also thought of as that which concerns itself with consuming as opposed to the productive processes of life. Each one of us uses according to our cultivation and capacity some of the world's supply of literature, music, history, art, science, or other appreciable products of men's minds. It seems to be the province of liberal education to make us efficient and appreciative consumers. It is not concerned with making the efficient producer. Industrial arts, then, if it is to be considered as a liberal-arts subject must render the individual more efficient as a consumer. A consumer of what?

The answer to this question constitutes the aims and purposes of industrial arts. By way of illustration, it can easily be conceived that the physician who has gained a rudimentary knowledge of printing, woodwork, electricity, and many other industrial-arts subjects in his elementary-school course, is more appreciative of his surroundings than one who has concerned himself only with those things which have a direct bearing on his vocation. His life consists of more than a mere vocation; it is supplemented and broadened by several avocations that interpret life more fully to him and add to the joy of living. It must be kept in mind also, that it is not essential that one be highly skilled in an activity in order to appreciate that activity. It is rather the contact with many phases of industrial arts and participation in varied activities than the concentration on a single line of activity that gives this broader appreciation. Industrial arts will not, then, demand such a high grade of achievement as will necessitate limiting activity to one subject, but will encourage contact with many in order that experience may be varied and appreciation broadened.

There is ample evidence in the more recent courses of study to indicate that the many-contact idea is growing in favor. Industrial-arts courses operative in the Chicago schools will serve to illustrate the trend toward multiplicity. They are: agriculture, art, basketry, canning, cement, cobbling, cooking, designing, electricity, mechanical drawing, millinery, printing, science, sewing, sheet metal, and woodwork, with other subjects to be added as interest demands. Many schools have now arranged the program of activities so that each pupil may come into contact with from eight to ten different types of industrial work. Under the Minneapolis junior-high-school plan, eight different shops are equipped in which it is expected that the student during his first year come into contact with at least six different types of work: the second year an election of three different courses is provided, while in the third year a more narrowing specialization in one course is expected. This at once precludes the possibility of a high degree of accomplishment in any one, but it does insure enough useful information and activity to develop an appreciation for the various subjects. Commenting on this phase of the subject, H. L. Briggs in "The Vocational Phases of the Junior High School" says, "In many cases the subjects suggested may be only touched upon. Printing, for instance, could consist of the simplest work, such as tickets, job directions, etc. We should, however, make the work of actual value in the way of experience and use metal type and not rubber. The machine work could be limited to a motor-driven grinder, a bench drill, drill press, and a small turning lathe." By conforming to present tendencies, industrial arts cannot be expected to produce a marketable product. In fact, its proponents would insist that a commercial product is far removed from the aims of industrial arts.

While these many contacts are to be desired even at the sacrifice of a certain degree of proficiency, it must not be assumed that the instructor of industrial arts is justified in accepting work that is slovenly done or that does not represent a conscientious effort on the part of the pupil. The standards of accomplishment are to be limited only by the degree of perfection possible in the length of time devoted to the subject.

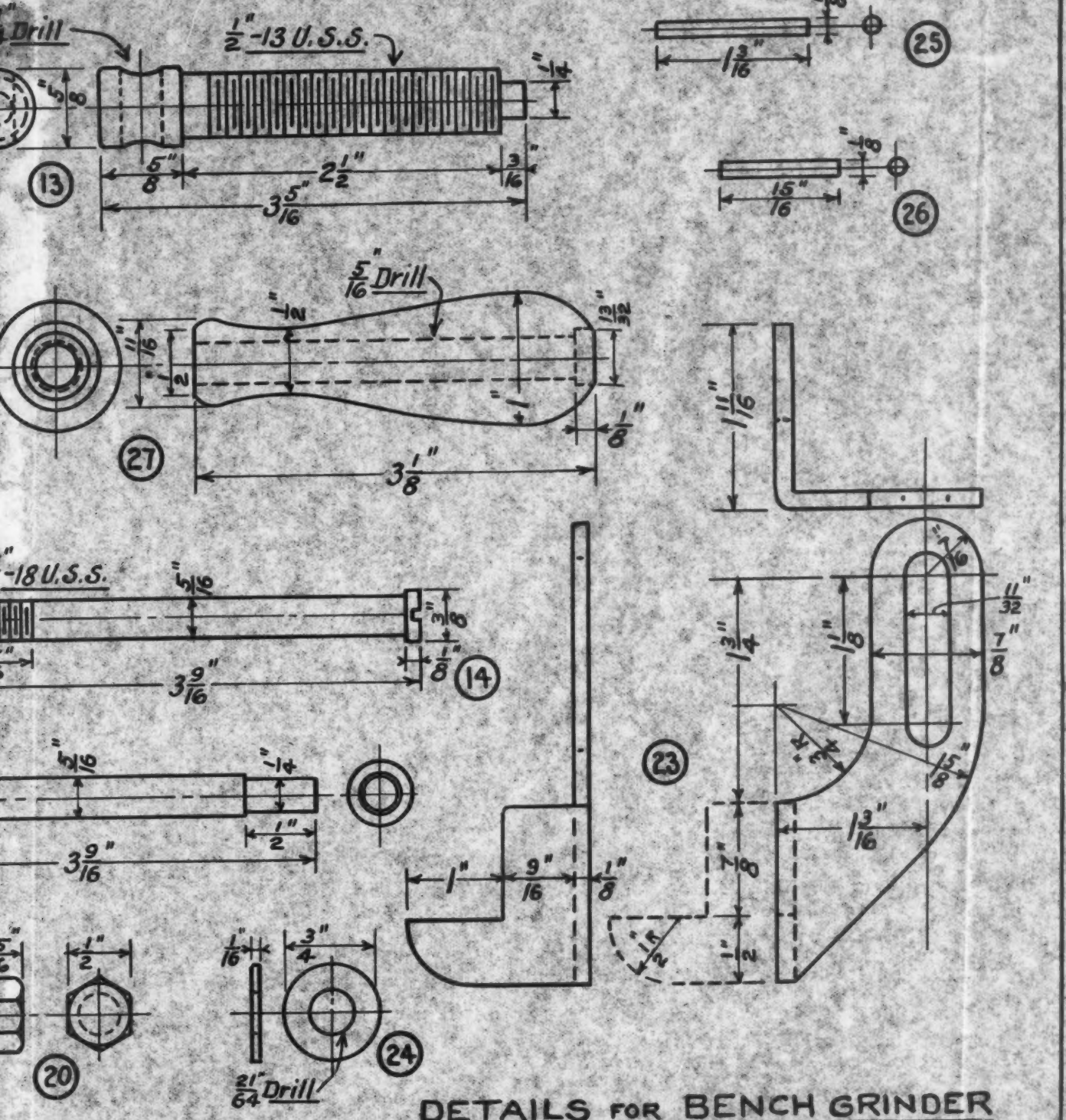
TRACING SUPPLEMENT No. 83.
THE INDUSTRIAL-ARTS MAGAZINE.
FEBRUARY, 1928



UNIV. OF MICH.

Designed by R. F. Davis, Hibbing Jr. College, Hibbing, Minn.

To be Reproduced for School Shop Use Only
© 1928, The Bruce Publishing Co.

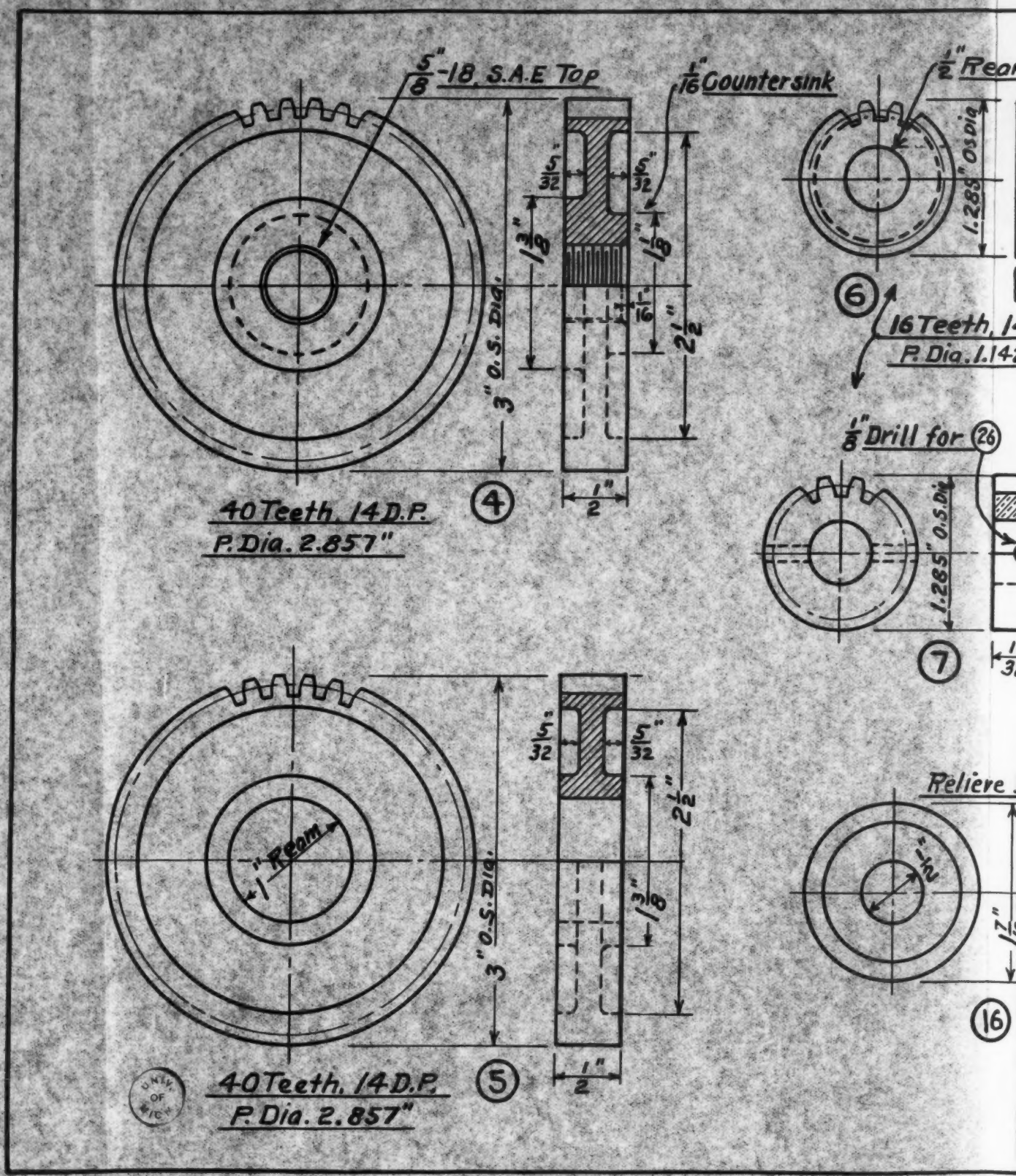


DETAILS FOR BENCH GRINDER

GF.

UNIV. OF MICH.

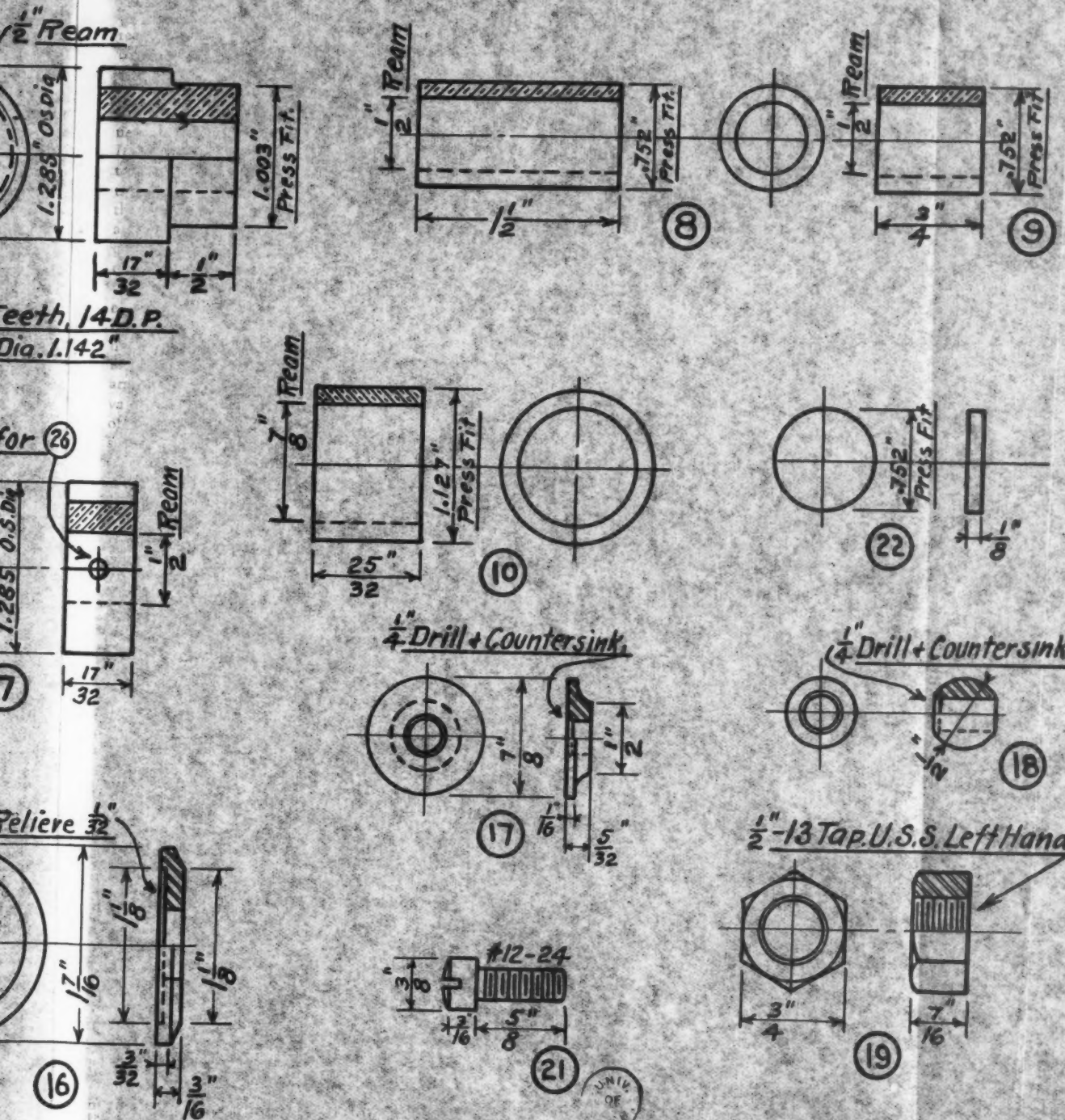
TRACING SUPPLEMENT No. 84,
THE INDUSTRIAL-ARTS MAGAZINE,
FEBRUARY, 1928



UNIV. OF ILL.

Designed by R. F. Davis, Hibbing Jr. College, Hibbing, Minn.

To be Blueprinted for School Shop Use Only
© 1928, The Bruce Publishing Co.



DETAILS FOR BENCH GRINDER

For Description See Page 63, Industrial-Arts Magazine, February, 1928.

Naturally, it is expected that as the pupil advances from the elementary school through the junior high school to the senior high school, a corresponding improvement will be shown in his product. It would be cause for congratulation if, during the later years of his industrial-arts work, his product had reached commercial standards. However, if such were not the case, the best that could be produced during the time allotted would cast no discredit on industrial arts.

Furthermore, industrial arts since it is not vocational in nature, can be presented throughout the grades in such a manner as is best adapted to the age and interest of the pupils. It can be given at the time when the child's natural inclinations toward manipulation and creation are at their height. It is true that judged by the standards of adult accomplishment, the product may be very mediocre, yet it represents an interest and an effort that may be just as necessary to the development of the child as any other subject in the liberal-education curriculum.

The inclusion of industrial arts in the program of liberal education does not prevent it from being of great assistance in helping to determine a possible vocation. In fact, one of the underlying principles of the junior high school is that its industrial-arts program in the first two grades shall be so arranged that the student may come into contact with these various subjects in order to enable him to select, by a process of eliminative likes and dislikes, a possible vocation. Considered in this light it is of the highest utilitarian value, while at the same time its value as a cultural subject remains undiminished.

It would seem, then, that the aims and purposes in industrial arts are (1) to broaden the intellectual and emotional horizon of the individual, (2) to make us appreciative consumers of that which is good in our environment, (3) to bring the pupil into contact with the world of activity, (4) to provide opportunity for the expression of the creative tendencies, (5) to aid in the selection of a suitable vocation.

Vocational education in some form or another is older than liberal education for the reason that it has always been necessary for man to have some sort of skill or occupation by means of which he could earn his living. The method which he used of transmitting his knowledge of such skills to his son constituted a method in vocational education. "The education whose controlling motive in the choice of means and methods is to prepare for productive efficiency is vocational." Viewed from this angle vocational education has always existed and must continue to be indispensable. Some agency of society must be under obligation to further it. There was a time when the home could and did discharge very satisfactorily the obligation of passing along a vocational education. As life increased in complexity and a division of labor gave rise to a distinctly commercial life new educational agencies had to be developed. Today industry itself and the school, public and private, constitute the educational agencies.

Snedden suggests that the callings which are entered by men and women, can be classified into (*a*) the professional, (*b*) the commercial, (*c*) the agricultural, (*d*) the industrial, and (*e*) the household. Each demands necessarily a different type of education but all are consistent in demanding that the education have one ultimate aim, namely, productive efficiency. As has been suggested earlier, numerous attempts have been made to use the schools as the agencies for vocational training but without marked success. The work when given in contact with the liberal-education curriculum has failed to develop that productive efficiency so necessary to vocational education. Hence, there has arisen a distinctly vocational school, establishing its own aims and purposes, its curricula and its method of procedure which are quite at variance with those of industrial arts. Almost in direct contrast to the broadening influences of the industrial-arts work, we find vocational education narrowing to a specialization and an emphasis upon usable output. This idea is more than implied in Dewey's definition of a vocation found in his "Democracy and Education" where he says that "A vocation means such a direction of life activities as renders them perceptibly significant to a person because of the consequences they accomplish and also significant because of their usefulness to his associates." He further suggests that the only adequate training for occupations is training through occupations.

The state and nation have recognized that there are types of students in our schools who are not interested in, nor perhaps can they profit by, the liberal education of which industrial arts is a small part. Consequently a schooling of strictly vocational type has been established whose aims are (1) to give thorough training in a vocation, (2) to produce a commercial product, (3) to limit activity to one type of vocation, (4) to make all supplementary subjects contribute directly to the vocational. The Smith-Hughes act passed by Congress in 1917 created a Federal Board of Vocational Education, one of whose duties it is to aid the states in establishing vocational schools giving instruction in agriculture, trades and industries, commerce and commercial pursuits, and home economics.

The aim of such schools is distinctly toward productive efficiency. Strict standards are set up by the vocational board which would prevent any school taking advantage of the act from liberalizing instruction to any extent. In fact, the outstanding criticism directed toward the administration of vocational schools is that it is too narrowing in its application. Any school wanting to come under the provisions of this act must meet certain definite requirements with reference to physical equipment, must employ only teachers who have had specific training along lines indicated by the board, and must offer only certain subjects for a specified length of time. A system of rigid inspection has been instituted to see that the requirements set up by the board are fully met before the federal financial allotment is made.

The Federal Government has appropriated annually $7,200,000 for carrying out the provisions of the act. This is distributed as follows: (*a*) $200,000 to meet the cost of administering the act; (*b*) for the preparation of teachers of vocational subjects, $1,000,000 allotted to the states on the basis of population; (*c*) $3,000,000 for teaching agriculture in schools of less than college rank, and allotted to the states on the basis of rural population; (*d*) $3,000,000 for teaching trades and industries allotted to the states on the urban population basis. These allotments are conditional upon the agreement of each cooperating state to match its federal allotment dollar for dollar.

It is at once very evident from even this brief review of the aims and purposes of industrial arts and of vocational education (as given in Smith-Hughes work) that real differences do exist. Let us summarize them. Industrial arts seeks to broaden the emotional and intellectual horizon of the individual. Vocational education by its concentration exerts a narrowing influence. Industrial arts would make us consumers of that which is good. Vocational education would make us producers of that which is good. Industrial arts would make students have contacts with a variety of courses. Vocational education would make the individual concentrate on one course. Industrial arts would sacrifice a certain degree of quality of product for a variety of experience. Vocational education would insist upon a high degree of accomplishment within a narrow field. Industrial arts would aid in the selection of a vocation. Vocational education provides the training once the selection has been made.

Thus it is that each type of instruction has its own body of aims, its own method of teaching, its own organization of work, and its own source of financial existence. Each in its respective sphere is doing a type of work that must not be underestimated, yet it must be kept clearly in mind that their contributions are directed toward different ends.

COMMERCIALIZING the INDUSTRIAL ARTS

Percy S. Hawkins, Grand Rapids, Michigan

EVERY industrial-arts teacher, no doubt, has received, at one time or another, a note like one of the following:

"Dear Teacher:

"Please find inclosed blue prints of chair. Kindly have your boys make up fifty (50) of these, notifying us when ready.

"Yours truly,

"A PENURIST."

Or in perhaps a more diplomatic way it comes like this:

"Dear Mr. Rube:

"The woodworking department at Progress School needs a quantity of faceplates for the lathes. Realizing that this would be an excellent problem for your boys, I am taking the liberty of inclosing the blue prints and asking that you have a quantity of these made up for us.

"Yours truly,

"I. C. ECONOMY."

No matter in what form your particular letter happens to come, you doubtless have had similar correspondence and you no doubt hailed its arrival with delight as you visualized the ecstasy of your students feeding foot after foot of material through your planer, at the other end of which are boys tumbling over each other with excitement fighting for the right to transfer the material to the power saw. This cannot run fast enough to keep pace with their enthusiasm, hence some in their eagerness to take part in the work, get out the hand saws to help the machine along. On and on through the various stages of construction this zealous spirit of cooperation permeates every boy in every class. They even give you their lunch hour in order to contribute to this sacrificial task of making several score of chairs for somebody else. The study periods, which until now, were an absolute necessity, are yours —since the boys prefer to study at home, in the quiet hours of the evening when the remainder of the household go to the movies. The ardor of your pupils continues, until one day a truck arrives for the completed chairs. Then you assemble your classes around the truckload of finished pieces, and have a picture taken, or maybe, to make it a little more interesting, you show your students all strung out, each with a chair in the hand, emerging from your school.

What a wonderful picture, if it were only true, but alas, it is purely imaginary and too often the vision of the occupant of a swivel chair who is building air castles. In reality neither the teacher nor the student can work up much enthusiasm over such a job. As a matter of fact, the teacher usually files such letters and thinks, if he does not say it, "I wish he knew my bunch of boys and what a nuisance that stuff is. I'd like to have him try out that kind of work as a teacher, and see what a wonderful educational project it is." You wish he could see the look of disappointment on the students' faces as you ask them to put aside something they are deeply interested in, something probably for dad or mother, and start on something which when finished he will never see again and in which he has absolutely no interest.

Now it may not happen to be your lot to have experienced such conditions, but the writer has in more than one state encountered these situations and knows that others have, and strangely enough some of these others do delight in this mass-production stuff. But are they real teachers, or capable craftsmen who in the forties of life have sought some lighter occupation with easier hours and gained admission to our educational institutions, because they are "practical" men. Understand me rightly—I do not disparage the practical man in the industrial arts—but he must have something to go with his practical knowledge of his trade that really makes him a teacher.

But to get back to the commercialization of our industrial education. Is it not a fact that this is decidedly a detrimental factor, and a hindrance to the one purpose of such education, namely, the general education and development of the boy? Imagine, for instance, an industrial-arts department which owed its existence to the business ability of the teacher in securing sufficient outside work to purchase the lumber for whatever pieces the students were able to make after satisfying the demands of the public, and having no more tables and chairs to repair for the school. This condition actually existed in one of our western cities as late as 1923, and with what result, that both the industrial-arts and domestic-science departments of that city's school system are today nonexistent.

That is an extreme case. Yes, perhaps so. Let us take another case which is a little milder. Five years ago, a school, where this commercialization process is in vogue, boasted of approximately 5,000 feet of industrial-arts floor space, with excellent equipment, and requiring the services of two teachers. Today the floor space has been halved, and one teacher is employed three hours per day.

In our endeavors to progress just a little faster than civilization, it seems that we have forgotten that we are not training apprentices for a trade, but that we are training apprentices for manhood, a much longer and far more important business than the former.

In one city in which the writer had the pleasure of teaching, these conditions were rife, so much so that one wondered whether the department was run by the board of education for the children or by the children for the board of education. It was a question whether it was an educational institution or a board-of-education workshop minus the salaries which are usually paid to workmen.

In righteous indignation, the matter was taken up with the supervisor, the unfairness to the boy was pointed out, and to the credit of the supervisor be it said, permission was given to the writer to handle the situation as he saw fit in the best interests of the boy and the department.

Glory be! Here was a chance to see whether the writer was right or not, but he had been trained in a hard school, which said—

Be fair to your students, loyal to your colleagues, square with your principal, and you will have no trouble with the board of education.

In order, then, to revive interest in the study of the industrial arts, which in the brief space of a few years had been almost eliminated from the curriculum of that school by means of the factory system, the parties enumerated in the foregoing and the permission was obtained to change the then existing system. What was the result? In the following year the number of students had increased over 50 per cent, which was increased the year following to a total of 128 per cent. This converted the writer's position from that of a casual teacher, to that of a bona fide member of the staff on full time. The metamorphosis was due to the fact that commercialism was ousted, and education was bid to enter.

There is no secret recipe for carrying out a similar transformation in your particular school should necessity for such exist. Just climb down the ladder of years to that spot where

you were a boy, just like those you are now teaching, and when you have done that you will not need any recipe.

Have you forgotten your first pocket knife? Don't you remember how you proudly dived away down into your trouser pockets to show all the neighbor boys what a regular "two-blader" you had?

Do you recall your first watch, or your first bicycle? No, you have not forgotten.

What was it about these, that made you the proudest and happiest boy? Simply the "pride of possession." Proud of your pocket knife, proud of your watch, proud of your bicycle. Precisely that same spirit dominates every boy in your classroom. He, too, resents having to put aside his own job which he possibly is making for dad's birthday, or for mother's kitchen.

We must not forget, however, that while pride of possession is a strong moving factor, yet to be looking everywhere for mere possession is not the best way to train for character or a liberal mind. It is well, therefore, to teach the pupil the value of cooperating with teachers and others. The school, as an institution, has many needs. Loyalty to the school should prompt, both student and instructor of the industrial arts, to be proud to help satisfy these needs. The doing of this is not commercialism, it is doing one's duty. The making of some scenery for a class play, or a base for a statue, the repairing of a dining-room table, or a kiddie car falls within the scope of industrial arts, but to deliberately demand 100 drawing boards, 50 rolling pins or a score of what-nots, is grossly unfair, both to teacher and student, and if those who are guiding the affairs of a school cannot see this, then the teacher must enlighten them. Such a production job may be perfectly satisfactory for a trade school, or a vocational school which specializes in mass production as a means of teaching a trade, though it may be doubtful even there, but the high school is no place for such endeavors. It has been said that just as long as these departments exist in our schools, they must justify their existence by doing this type of work. It may be replied, however, that unless their inclusion is warranted upon an educational basis they should never have been organized. Is all labor educative or only that which is pursued educationally? Is it not true that doing something which is merely mechanical, is not following our educational aims?

While it is true that children have more points of resemblance than difference, and that the resemblances are of greater importance in the long run, yet the differences are of a very high value in themselves and of great consequence to the individual. This accounts for Bill wanting to make a tool chest while Jim wants a smoking cabinet. This should not be construed to mean that every boy should be permitted to make anything he desires any time he wishes, irrespective of his ability, but I do believe that Bill's tool chest can be designed so that he can make it, and likewise Jim's smoking cabinet, and it is the real teacher's job to do it.

Let the teacher provide the problem and the student the project, provided, of course, sufficient preparatory work has been done to convince you that he has the fundamental knowledge to undertake the project. If this is done what happens? The student gets what he wants in material form while the teacher gets the results he desires from an educational standpoint. Both are satisfied and the study of handicraft holds its place as an educational process, remaining respected and admired by its oftentimes misdirected opponents. If the commercial method is employed, what is the result? The board of education or some other institution saves a few dollars, but doesn't know it without being told or maybe shown in the actual working costs of a specific department, while the poor student for whom that department is, or should be conducted, gets a pat on the back for executing a minor portion of some larger project which has taken him probably a whole semester's work. The sad thing is that by doing this work the student has not had the score or more of varying experiences which normally would be his if the work were conducted on an educational basis.

The student's prime reason for attending school is to get education, and education comes through surmounting obstacles —not in manufacturing articles on a wholesale basis.

THE TEACHING CONTENT and OBJECTIVE TESTING IN HOME MECHANICS

L. V. Newkirk and G. D. Stoddard, State University of Iowa

WHAT ARE the most commonly taught jobs in home mechanics? What array of jobs would make up a good course of study in home mechanics? Is it possible to find the jobs the leading schools are teaching in their classes? If we can find the jobs what grade or grades are receiving the instruction? Is the work required or elective? These questions represent our first problem; namely, to discover the basic jobs of home mechanics and to discover, if possible, the specific grades in the school system where the work is offered with the greatest success.

To find the group of jobs which make up the teaching content, it was necessary to make a nation-wide survey of schools which were offering home-mechanics work and see what they were really attempting to teach in their courses.

The questionary was the most direct means of securing the required data. In order to determine the items which were to be included in the questionary, an analysis of several courses of study including those from St. Louis and Detroit, was made. In addition to the courses of study, a number of surveys were made to discover the outstanding jobs on the basis of social utility. If a job had a high rating from the standpoint of social utility, and was not in any of the courses of study, the job was put into the questionary.

A carefully prepared questionary was sent to schools which were offering home-mechanics jobs. The following table shows the kinds of jobs, and the frequency with which they appeared on the returns which were received from 75 schools.

Possible Home-Mechanics Jobs

	Name of Job—	*Frequency*
1.	To make suitable splices, taps, and terminals in electric wires	64
2.	To wire simple bell circuits	61
3.	To test and repair a defective bell circuit	59
4.	To test and repair electric bells and buzzers	56
5.	To test and repair push buttons	51
6.	To install bell-circuit transformers	40
7.	To make an extension cord	62
8.	To connect wires to attachment plugs	62
9.	To test and repair heater-attachment cords	51
10.	To wire an electric-light socket	63
11.	To wire an electric reading lamp	55
12.	To test and replace blown fuses	53
13.	To refill fuse receptacles	45
14.	To read the electric meter	46
15.	To clean and make minor repairs on a small motor	19
16.	To build an outdoor aerial	12
17.	To test and repair aerial and ground circuits	10
18.	To test and overcome weak signals in the secondary circuit	8

	Name of Job—	Frequency
19.	To trace and overcome weak signals in the telephone circuit	6
20.	To trace and overcome intermittent signals in the aerial and ground circuit	8
21.	To trace and overcome intermittent signals in the secondary circuit	7
22.	To trace and overcome intermittent signals in the telephone circuit	7
23.	To trace and overcome continuous oscillations in the radio frequency amplifiers	8
24.	To trace and overcome weak or no signals in the radio frequency amplifiers	8
25.	To trace and overcome howling or whistling in the audio frequency amplifiers	7
26.	To trace and overcome weak signals in audio-frequency amplifiers	6
27.	To name the various pipe fittings	47
28.	To cut and thread pipe	48
29.	To assemble pipe and fittings	45
30.	To shut off water supply and drain pipes	44
31.	To repair leaking compression faucets	57
32.	To repair a leaking fuller faucet	53
33.	To pack a leaking globe valve	25
34.	To repair a garden hose	30
35.	To shut off the water supply to heater tank and drain the tank	17
36.	To clean a drain trap and pipe	30
37.	To repair a flush tank	21
38.	To remove obstructions from the toilet bowl	19
39.	To thaw out frozen pipes	20
40.	To stop leak temporarily in water pipe	25
41.	To stop leak temporarily in gas line	13
42.	To read the gas meter	34
43.	To make and use putty	52
44.	To cut glass to size	60
45.	To glaze a sash	53
46.	To take a sash out of a window frame	38
47.	To set a glass in a French door or mirror	16
48.	To replace a broken or worn-out sash cord	37
49.	To adjust window stops	30
50.	To put up a roller curtain	25
51.	To put up a set of curtains or drape rods	13
52.	To apply window-sash fasteners	18
53.	To adjust doorstops	18
54.	To apply weather stripping	13
55.	To adjust door catches	28
56.	To adjust and replace door knobs	30
57.	To set hinges	49
58.	To set a mortise lock	38
59.	To set a rim lock	28
60.	To set a lock in a drawer or desk	31
61.	To reverse a mortise lock	25
62.	To set drawer pulls	35
63.	To set hasp and staple	39
64.	To use screw hooks and eyes	46
65.	To true up a door that sags or binds in the jambs	29
66.	To tin a soldering copper	63
67.	To mend leaks in kitchen utensils	62
68.	To solder splices in wire	61
69.	To replace broken lock springs	30
70.	To repair work with rivets	42
71.	To use metal mending plates	31
72.	To apply outside paint	58
73.	To apply inside paint	59
74.	To apply stains and fillers	61
75.	To apply varnish	60
76.	To apply calcimine	24
77.	To use varnish remover	43
78.	To refinish a piece of furniture	50
79.	To use metal paints	20
80.	To clean and care for brushes	56
81.	To make form for concrete work	39
82.	To locate studding in a wall	27
83.	To make window screens	36
84.	To repair broken furniture	52
85.	To replace handles in house and garden tools	28
86.	To fit and keep cabinet drawers in good operating condition	20
87.	To reseat a chair	34
88.	To make and put in a shelf	38
89.	To repair a floor	11
90.	To make and place bird houses	43
91.	To make a small workbench	27
92.	To repair toys	34
93.	To know the names and functions of the parts of a house	20
94.	To clean and adjust a kerosene burner	6
95.	To clean and adjust a gas burner	8
96.	To clean and operate a furnace	12
97.	To know fuels and their economic use	8
98.	To repair covering on hot-air furnace pipes	6
99.	To repair covering on hot-water or steam pipes	7
100.	To clean the smoke flue pipe from the furnace	4
101.	To make concrete	45
102.	To mend broken concrete work	22
103.	To put new concrete in forms	40
104.	To make small concrete articles	41
105.	To patch plaster	23
106.	To do tuck pointing	6
107.	To drill hole in concrete and in brick work	28
108.	To color mortar	16
109.	To waterproof cement work	11
110.	To sharpen wedge edge tools	51
111.	To sharpen shears	28
112.	To sharpen garden tools	25
113.	To sharpen and adjust a lawn mower	30
114.	To remove rust from tools and cutlery	24
115.	To rehandle tools and cutlery	21
116.	To rehandle utensils	14
117.	To wrap and tie packages	6
118.	To tie common knots	18
119.	To splice rope	11
120.	To whip the end of a rope to prevent raveling	17
121.	To nail on half soles and rubber heels	4
122.	To use glue for general repair	52
123.	To regulate a watch or clock	6
124.	To connect up batteries in series and parallel	55
125.	To shape the point of a screw driver	51
126.	To file a key for a lock	34
127.	To read working drawings	50
128.	To do simple lettering	43
129.	To make working drawings of simple objects	45

Results of the Survey

While the foregoing table contains the results obtained from only 75 schools, yet these schools were scattered over the entire United States and one came even from Hawaii. It is our belief that the addition of 75 more schools would not have made any significant difference in the results because the jobs that were ranking high at 50 were in all cases the outstanding jobs at 75. It is true, however, that the suggested jobs would have been a somewhat larger group.

We found that home mechanics is offered from the fifth to the twelfth grades and that it is given as both elective and as a required subject. Home mechanics is divided into the following per cents by grades according to our analysis of 75 schools:

Grade	Per Cent
5	1
6	1
7	30
8	40
9	20
10	4
11	2
12	2

Home mechanics is required in 74 per cent of these 75 schools and is an elective in 36 per cent. The results of this study seem to show that it is most common practice to make home mechanics either required or elective in the 8th grade but it is also a common subject in the 7th and 9th grades.

The following jobs were given on the questionary in addition to those listed. These jobs are being taught by certain instructors throughout the United States. While many of them are good jobs, the same job was not mentioned by a significantly large number of schools to warrant a statement of their real value.

Additional List of Suggested Home-Mechanics Jobs

1. Open wiring.
2. Wiring through conduits.
3. Build a radio.
4. Tie all electrical knots.
5. Fit and hang a door.
6. Build stairways.
7. Replace and adjust window weights.

8. Cut rafters to various pitches.
9. Lay flooring.
10. To lay shingles.
11. Whitewash and calcimine.
12. Make concrete walks and steps.
13. Repairing electric iron.
14. To frame a picture.
15. To read the water meter.

The following 72 home-mechanics jobs were picked on the basis of two criteria; first, because in the majority of cases they were checked as being in high favor in 75 home-mechanics courses, and second, because in all cases they are justified as shown by surveys on the basis of social utility. We cannot say that job No. 1 is better than job No. 2 nor can we say that job No. 1 is better than job No. 20. We can say, however, that these 72 jobs are a foundation upon which to build a modern course of study in home mechanics, because of their high rating by 75 representative schools, their use in best courses of study and their justification from the standpoint of social utility.

High-Ranking Jobs in Home Mechanics

1. To put new fuller ball in faucet.
2. To solder holes in sheet metal or cooking utensils.
3. To glue new stock together.
4. To rewasher a leaking compression faucet.
5. To shape the tip of a screw driver.
6. To make a bird house.
7. To grind a badly nicked wedge edge tool.
8. To make a joint with tinner's rivets.
9. To make a window screen.
10. To whet a wedge edge tool.
11. To grind a plane iron.
12. To thread a piece of pipe.
13. To apply stains.
14. To assemble an attachment cord for an electric iron.
15. To refinish a piece of furniture.
16. To apply paint on new wood.
17. To file a Yale key.
18. To frame a picture.
19. To sharpen scissors or shears.
20. To install doorbells.
21. To assemble a radio set.
22. To detect and replace a leaking rubber tank ball.
23. To true up a door that sags or binds in the jambs.
24. To detect and replace a blown fuse in the lighting circuit.
25. To sharpen a crosscut saw.
26. Rewasher the ball cock of a closet tank.
27. Apply two coats of rubbing varnish.
28. To read the water meter.
29. To sharpen a lawn mower.
30. To select a new paint or varnish brush and prepare it for use.
31. To upholster a chair or stool seat, using an edge roll.
32. To adjust a lawn mower.
33. To use varnish or paint remover.
34. Wire electric-light sockets in parallel from 110-volt a.-c. line, including in the circuit a watt-hour meter and a snap switch.
35. To connect dry cells in series.
36. To hook up the aerial system of a radio using a lightning arrester.
37. To make a picture frame.
38. Make N. E. C. splices in No. 14 wire.
39. To fasten a joint with corrugated fasteners.
40. To whet a plain iron.
41. To cut a piece of pipe.
42. To fasten wood together with flat-head screws.
43. To assemble an extension cord for an electric lamp.
44. To set a pair of butt hinges.
45. To grind a chisel.
46. To replace a defective spring in a mortise lock.
47. To make a joint with round-head screws.
48. To cast an article from concrete using a form.
49. To repair a small hole in a plastered wall.
50. To cut a right-hand thread on a rod.
51. To remove old varnish and revarnish.
52. To drill a hole in masonry using a star drill.
53. To reseat the ball cock of a closet tank.
54. To wind an electromagnet.
55. To put a new handle in a hammer.
56. To file a key for a common door lock.
57. To clean a clogged drain trap.
58. To attach a swivel coupling to a garden hose.
59. To prepare a pot of glue.
60. To sharpen a ripsaw.
61. To glaze a sash.
62. To tin soldering copper.
63. To read the electric meter.
64. To clean and care for a varnish or paint brush.
65. Repair a leather heel that has the back worn down.
66. To repair defective window weights in a double-hung window frame.
67. To apply paste filler to open-grained wood.
68. To read the gas meter.
69. To wire two bells in series using one push button.
70. To connect three dry cells in parallel.
71. To wire two bells in parallel using one push button.
72. To hook up A and B batteries, aerial, and ground on a radio set.

After the foregoing material had been gathered and summarized, the next question was how to teach the content in an efficient manner. To determine this some form of objective measure was required, because it was felt that the written examination is not an instrument fine enough to study teaching methods and technics.

Since there did not exist an objective test in home mechanics which would do these things, it was found necessary to construct one. This test has been constructed along the most scientific lines known to modern test construction.

Construction of the Test Questions

What type of objective examination question is best fitted to the testing of 72 jobs in a comparatively short time? There were available the recall or completion, multiple response, true-false, matching exercises, best answer or judgment, identification and rearrangement and their variations, but they did not seem to fit the material. After experimenting and trying a number of the standard forms it was found that a special type of procedure test was well adapted to home-mechanics content. The following is an example of a typical procedure question taken from the Newkirk-Stoddard home-mechanics test.

"No. 24. To Sharpen a Ripsaw.
Procedure:
1. Shape the teeth.
2. Give the teeth a bright top.
3. Clamp the saw in a vise.
4. File the teeth.
5. Set the teeth.
6. Joint the teeth.

Rearrange the numbers to show the correct procedure:
( ) ( ) ( ) ( ) ( ) ( )"

The problem of the pupil writing this type of objective examination is to put the numbers to the left of the steps in the procedure into the parenthesis below in an order which shows the correct procedure for doing the job. This type of question was tried out on approximately 1,000 cases and it proved to be quite satisfactory. The pupil who knows nothing about a job has one chance in 720 to guess the correct procedure. If the pupil can put down the correct procedure in a minute it is a pretty sure sign that the pupil knows that job and can do it if given the opportunity. If the pupil knows only a little about the job, he is given credit because the test is scored on both the number of jobs and the number of points correct. The procedure is so arranged that no step can be out of order and still be right. It has also been shown that this is not an intelligence examination where the bright or mature pupils can figure out the correct answer by reasoning. This test has been given to seventh graders who have had a year's work in home mechanics and to a group of mature university students, several of whom were candidates for the Ph.D. The seventh graders made a much better score. As might be expected, however, intelligent pupils who have had the same training as pupils which rate lower on intelligence scales get the best scores. Another useful characteristic of this type of question is that it has some real diagnostic power and it enables the instructor as well as the pupil to tell where the strong and weak points are.

The questions in part II of the Newkirk-Stoddard home-mechanics test are of a similar type and have the same advantages, but are designed to test the pupils' knowledge of

several common electrical circuits. This type of question consists of a picture of the electrical instruments to be wired but the wires are not shown. There are black dots wherever a connection is to be attached. The pupil is asked to draw lines between the black dots to show the correct circuit. These circuit-completion questions have some real diagnostic power, and will show not only what the pupil doesn't know, but also the circuits or parts of circuits with which he is familiar.

The Experimental Tryout

After the jobs had been put into the forms of questions and tried out in the university high school, a thousand copies of the test were printed and the experimental edition was given to the following twelve schools:

1. Rochester High School, Rochester, Minn.
2. Roosevelt High School, Salina, Kans.
3. Marine City High, Marine City, Mich.
4. Junior High School, Leavenworth, Kans.
5. West Port Jr. High School, Kansas City, Mo.
6. Central Jr. High School, Kansas City, Mo.
7. Okmulgee High School, Okmulgee, Okla.
8. Industrial Arts School, Wakefield, Mich.
9. Central Junior High School, Stoughton, Wis.
10. Pontiac Junior High, Pontiac, Mich.
11. Handley School, Winchester, Va.
12. Deadwood High School, Deadwood, S. Dak.

The tests were given to these schools because their answers to the home-mechanics questionary indicated that they were giving in their classes an excellent content in basic home-mechanics jobs.

The reliability of this experimental edition using the chance half-method and the Spearman-Brown formula was calculated to be 90 per cent for a single grade. The reliability varied from 85 per cent to 93.5 per cent.

The per cent of pupils passing each item was calculated. The test items were arranged into descending order of difficulty and were then divided into two equivalent forms. The test was again printed in the final forms, A and B. The two new forms each contain 36 home-mechanics jobs, and it requires 40 minutes to give one of the forms. The scoring key is purely objective. The pupil has two scores, a point score and a job score, but there is a high relationship between the point scores and the job scores. It is estimated that the test in its new form will have a reliability of 90 per cent for a single grade (correlating one form against the other).

THE STUDY OF ANTIQUES IN SCHOOL

Herman Hjorth, Saunders Trade School, Yonkers, N. Y.

THE UNIVERSAL INTEREST in antiques has developed to such an extent that one may almost be tempted to call it a "craze," were it not for the fact that this interest, in spite of its mushroom growth, has taken permanent root among all civilized peoples.

This country has been gone over for antiques again and again with a fine-toothed comb, so to speak. Untold treasures in furniture, brasses, glass, porcelain, and textiles have been salvaged from the attics of old houses; hardware, doors, and paneling have been carefully removed and set up in new mansions; and—even more remarkable—priceless hand-printed wall papers have been removed from old walls by superskillful craftsmen, and thus saved from ruin and destruction.

These treasures, needless to say, have found their way into the homes of the wealthy, and it would be natural to deduce, that this desire for antiques is confined to this class of people. The fact that this is not so, but that an increasingly great number of people are becoming interested in antiques, is the most encouraging and valuable part of the whole business, because it has brought with it a general appreciation and understanding of art and, best of all, a healthy thirst for this kind of knowledge.

It is now one of the requisites of common culture to know something about the different "periods," their distinguishing features, the historical facts connected with them, and their influence on design and usage. This knowledge is necessary not only for the educated man or woman, but also for the craftsman, who must supply the insatiable public demand for antiques by faithful and artistic reproductions in toto or in part. The modern craftsman must, therefore, not only acquire the mechanical skills necessary in his craft, but he must also be something of an artist and a student.

Schools in general and shop instructors in particular should recognize these facts and plan their courses of study accordingly. To illustrate with a concrete example: A boy is making a piece of furniture having features of design characteristic of one of the important periods. Besides the technical skills to be learned by the boy, a certain amount of information and understanding of the period should be acquired by the whole class. The following outline, which may either be elaborated upon or condensed, is an example of such auxiliary information. This, again, should be supplemented by pictures and visits to museums and stores dealing with antiques. Furniture construction is in this case the feature that is emphasized. The work may easily be divided into smaller units and assigned to various members of the class, who may then make reports to the whole class. Cooperation and correlation between the shop and history departments will no doubt prove valuable and profitable to both.

The Jacobean Period

1. *Time and Origin of Name.* The Jacobean period dates from 1603-1688. It is generally subdivided into three parts: The early Jacobean period lasted from 1603 to 1649; the middle, or Cromwellian, period continued from 1649 to 1660; and the late, or Carolean, period extended from 1660 to 1688. The period is named after James I, of England, the Latin equivalent of whose name was Jacobus. The middle part of the period is named after Cromwell, and the late part after Charles II.

2. *Principal Historical Facts: A. Early Part.* The whole period may be characterized as one of religious strife and dissension, and practically every important historical event that took place during that time may be traced to this basic cause.

James I (1603-1625) and his son Charles I (1625-1649) were the rulers of England during the first part of the period. They were both of the Anglican faith, while many of the common people were Puritans (Calvinists). The Puritans were rapidly growing in numbers, and as they had a majority in parliament and hated everything which savored of the older religious practices and observances, the relations between king and parliament grew steadily worse. Finally Charles I dismissed Parliament and ruled for eleven years by what he considered "divine right."

So much injustice and persecution was suffered by the Puritans that 20,000 of them emigrated to the American colonies in the decade between 1630 and 1640. Jacobean furniture was, therefore, the first type to be brought to New England. The king's tyranny caused such bitterness among the different classes of people, that it finally culminated in

the Great Rebellion of 1642. The army of the common people under the leadership of Oliver Cromwell defeated the king's army. The king was condemned to die and was beheaded in 1649. His son Charles, however, escaped to France where he was protected by Louis XIV.

B. Middle Part. During the Commonwealth (1649-1660) Cromwell ruled England with an iron hand. Religious persecution continued. When Cromwell died in 1658, there was no leader capable of taking his place. Confusion and discord among the Puritans undermined the structure which Cromwell had built and gave the royalists an opportunity to restore the monarchy.

C. Late Part. The late Jacobean or Carolean period dates from the restoration of the monarchy under Charles II, who was a son of Charles I, and reigned from 1660 to 1685. After his death, his brother James II (1685-1688) succeeded to the throne. These two kings apparently had not learned anything by the misfortune of their father, because they both constantly antagonized the people. Finally the people offered the throne to William of Orange, who had married James' oldest daughter Mary. He accepted at once, and after gathering an army, entered London without opposition. James fled to the continent and with him ended the Jacobean period.

3. *Characteristics of the Period and their Historical Significance: A. Early Part.* The design of the furniture during the first part of the period was influenced by the Renaissance. This movement, which originated in Italy around the year 1500, was introduced into England by Henry VIII. During the reign of his daughter Elizabeth, the Italian renaissance designs, however, were considerably modified by national characteristics.

The furniture from the early Jacobean period is somewhat heavy, cumbersome and rectangular in shape. It was made of oak and consisted mainly of such pieces as refectory tables, four-poster beds, trundle beds, stools, forms, chairs, settees, various types of cupboards, chests, dressers, etc.

As the times were undemocratic, four-poster beds and chairs were used only by the nobles and persons of means, while ordinary mortals slept on trundle beds and sat on stools and forms. A trundle bed was a kind of folding bed that could be pushed under the palatial four-poster during the day, and forms were simply benches without backs.

The legs of tables, chairs, cupboards, beds, etc., were always turned. On beds, cupboards, and refectory tables the turning was generally bulbous or melon shaped in form. Turned legs usually had square parts, which were connected with rectangular stretchers. The chairs were nearly always paneled (wainscot). They were often convertible into tables and had a wooden seat. This was sometimes softened with cushions or pads covered with gay materials such as velvets or damasks of red, blue or green, and sometimes with a form of embroidery called Turkey work.

The principal forms of decoration were: Shallow carving, split balusters, and geometrically shaped moldings around doors and drawers. The most common forms of carving were the figure eight, the half circle, fluting, channeling, notching, grapevine, floral designs, and the acanthus leaf. Split balusters or geometrical shapes of wood were glued to rails, stiles, or panels. These were often painted black and the background a bright red for contrast. The mounts were generally very simple. Round knobs of metal or wood and plain escutcheons were the most common forms.

B. Middle Part. During the Commonwealth the furniture became more simple with little or no carving, as any ornamentation was considered "sinfully frivolous" by the straight-laced Puritans. A more democratic spirit, however, resulted from the rebellion and manifested itself in various ways. Chairs, for example, became common and were used by rich and poor, noble and commoner, master and servant alike.

Little attention was given to personal appearance during the early and middle part of the period, and cleanliness, either general or personal, was practically an unknown quality. The houses were poorly built and consequently drafty and uncomfortable during the winter months. The floors were covered with straw, which often became very offensive with its accumulation of filth. It is said that the reason the chairs and tables had stretchers was that it enabled persons to keep their feet off the noisome floor.

C. Late Part. A remarkable change in the furniture styles, which it is impossible to understand without a knowledge of the historical background, took place during the late period.

Chairs became much lighter and more graceful. The seats were no longer made of wood, but of cane, leather, rush weaving, or upholstery. The carving became freer, deeper and more elegant, and inlay, gilding, and lacquering also were used as a means of decoration. The Flemish scroll was introduced from the Netherlands, and the spiral turning, as well as lacquering and caning, from India by way of Portugal. New pieces of furniture made their appearance, such as small tables, daybeds, mirrors, tall clock cases, etc., and all furniture became much lighter and more graceful and refined.

Walnut largely replaced oak as the principal cabinet wood in the mother country, while in the American colonies ash, elm, maple, cedar, and pine were used as well. Mounts, escutcheons, and other metal work became more refined and ornamental. The mounts were pear-shaped and the plates and escutcheons pierced and chased. With regard to the fabrics used for chair covers, curtains, bedspreads, and the like, they were generally made in bright colors and were frequently hand embroidered. Such materials as velvet, damask, linen, painted calico, satin, plush, and silk are recorded in old inventories.

The reasons for these radical changes are: First, that Charles II had lived at the magnificent court of Louis XIV during his exile, and had become a great admirer of French art and customs. When he became king in 1660, he introduced this French magnificence at the English court. Second, that he married a Portuguese princess, who desired luxury as much as he. She, in turn, introduced furniture styles peculiar to India, which had found favor in her country, and third, that Louis XIV in 1685, with his revocation of the Edict of Nantes, caused many of the French Huguenots to emigrate to England. As some of these were excellent craftsmen, they gave a tremendous impetus to the mobiliary art, and to the textile industry in that country. These conditions affected America, because many of these emigrants also came to the colonies.

THE TEACHER

Lord, who am I to teach the way
To little children day by day,
So prone myself to go astray?

I teach them knowledge, but I know
How faint they flicker and how low
The candles of my knowledge glow.

I teach them power to will and do,
But only now to learn anew
My own great weakness through and through.

I teach them love for all mankind
And all God's creatures, but I find
My love comes lagging far behind.

Lord, if their guide I still must be,
Oh, let the little children see
Their teacher leaning hard on Thee.

Author Unknown.

INDUSTRIAL-ARTS MAGAZINE

EDITORS

E. J. Lake *S. J. Vaughn* *J. J. Metz*

EMPHASIS ON THE ART OF TEACHING

The industrial arts and vocational education have scarcely had a chance to develop a satisfactory and established method of instruction. That great strides have been made cannot be denied.

One does not have far to seek to find the reasons for this lack of uniformity and absence of accepted method. The early part of the history of this work was consumed with the fight for a place in the system. And it was a real fight, as only those who participated in it can fully appreciate. During the struggle for recognition, individual efforts were faithfully made to determine a rational content and a satisfactory method of shop procedure. Much of the time was consumed in the effort to arrive at a standard method of tool operation.

In due time, the emphasis shifted to courses of study; and with what religious zeal the teachers of 1900 to 1910 struggled with the problems involved in the making of courses of study. A group of zealous men in Illinois during this time made notable contributions to this undertaking. It was finally discovered, however, that before any real progress could be made in the matter of courses of study, some definite objectives would have to be set up. Then came the universal search for objectives and the universal attempt to formulate them into understandable propositions.

No sooner had the study of objectives got well under way, than it became apparent that some analyzing would have to be done in order to fit together the objectives, the courses of study, and the occupations that were to be studied. Trade analysis, job analysis, individual analysis, etc., came into prominence and made lasting contributions to the cause of industrial and vocational education.

Consumed with the pressing problems that all these matters of fighting for recognition, formulating courses of study, setting up objectives, analyzing all the elements involved, and again formulating new courses to meet the new conditions produced, the teachers found insufficient time to try to formulate the actual principles of *teaching* in these new fields and to put such principles satisfactorily into practice.

Now the great task is to get *better teaching* done. The challenge is on the quality of the teacher and the character and skill of his instruction. All that has gone on before in the way of struggling for recognition, formulating courses of study, setting up objectives, etc., will avail but little if we do not eventually develop a *teaching technic* in the classroom and shop equal to our knowledge of occupations, our ability in formulating and analyzing, and our skill of hand.

Well may the programs of the next conventions, both state and national, be devoted to the serious discussions and demonstrations of the fine and difficult art of *teaching*.

ORDERLINESS

We hear much nowadays about the school shop being made an exact copy of the industrial shop so that the student may get a thorough and true concept of what his life will be when he leaves school, and in order to help the student more readily to span the gap between school and industry. To accomplish this purpose, present-day shop teachers insist that they be provided as much as possible with the same kind of tools that are used by the mechanic in the industrial shop. The language of the shop is adopted and transferred into the classroom discussions. Projects are chosen which require as many actual shop processes and skills as possible. After this is done the teacher prides himself upon the fact that he has transplanted real shop conditions into his classroom. But has he? Are there not other factors that have not been touched? Take for instance the question of orderliness in the shop. Does every school shop instill the idea of a place for everything, and everything in its place?

An inspection trip through some school shops shows that there is room for a great deal of improvement in this direction. Of course, there is limited room for storage of equipment, materials, finished and partly finished work in the average school shop. Of course there is but a very limited time that can be devoted to the cleaning up of the school shop. Of course there are industrial shops that look a hundred times worse than the most slovenly kept school shop in existence. That, however, does not absolve the shop teacher from trying his best to make his shop also approximate the best industrial shop practices in this vital factor of shop orderliness. As a standard for this orderliness we must, of course, choose the best that industry has to offer. A study of the efficient manner in which this matter is taken care of in the modern industrial shop is really astounding, There are industrial foundries which when visited after the week's work is over, look as clean as any machine shop; auto repair shops that rival the appearance of a woodworking establishment; printshops that can bear comparison with any drafting room in existence. Are these conditions important enough to be copied?

The question may be asked, Is it not oftener the rule than the exception that such industrial shops are met? Must not our boys work in places where the factor of orderliness is a thing that is largely overlooked or at least not emphasized?

It is true that many industrial shops still look upon the time spent in cleaning up as so much time wasted. They fear that they are merely adding to their overhead. They feel a shop must naturally be dirty and untidy because it is a shop. They lose sight of the psychological effect of order and cleanliness on the worker. They forget that orderliness really spells profit. The school shop, however, must not follow this short-sighted policy. In the attempt to bring real shop atmosphere into the school, the teacher can do no better thing than to study the methods of cleanliness and orderliness as practiced in the best industrial plants, and to make them part of his shop procedure.

COPIED CULTURE

Those interested in the promotion of industrial-arts education are often accused of lacking regard for cultural values in education.

One interesting reflection on the much-discussed standards of culture is that culture may not be borrowed but is always expressed by accomplishment and behavior.

To do what the Greek did would condemn modern civilization as it condemned the Roman in the expression of Horace, "Rome led captive by the imitation of Greek culture."

We are sometimes compared to the Roman in the way of material interest and ambition but we have yet to be "held captive by imitation."

It will become the crowning glory of industrial-arts education to develop the conception and ability to do and act with beautiful propriety. *Industrial arts are short on art.* Our industrial-arts teachers are not so well informed on art as they are on industry. The appearance of a piece of work concerns them less than the technical process by which it is made. They take especial interest in the mechanical device, the exactness of construction, and the quality of materials used, but in their zest for the so-called practical side of their instruction they

often neglect the important practical element of design and appreciation of appearances which is rapidly becoming necessary to industry.

Art stands in a bad light with many manual-art teachers because they confuse art with decoration.

Any commodity which is deliberately prettified by the addition of ornament is rarely artful. The art student has little reason to study ornament excepting to recognize the harmonious relation between parts of a design. Ornament that does not become essential to the object on which it is applied is a rival attraction.

Borrowed or copied enrichment of industrial commodities is little better than borrowed manners.

The industrial-arts teacher must insist on self-expression through design before the subject can become cultural.

—⟡—

THE WORKER AND HIS EDUCATION

There is a growing consciousness of the need for adult education. The time was when school was defined and looked upon as "the place to prepare for life." In that day, occupations were constant; life was lived at a slow rate; the whole trend of things was opposed to change of any sort.

What a transformation now! Today everything is changed. The facts, methods and skills, we acquire today may become obsolete and useless next week or next month. And what tragedies have resulted in the past from the changes that have thrown out of employment the multitudes who had spent the major part of their lives in perfecting certain skills that discoveries and inventions rendered out of date and useless.

The new day has now come when long periods of time are not devoted exclusively to the acquiring of certain manipulative processes and skills that may be displaced over night. But the time is shared with the effort to *think straight* in terms of the demands of the fields in which the individuals propose to work; to understand the principles operating in those fields; and to gain a certain power of adaptability and adjustment.

But the school as a means of preparation for adult vocational life is becoming more and more handicapped and unable to foresee the needs and demands in even the immediate future of many occupations.

There is the terrific need of the *continuing* school that will keep abreast with the changes in the various fields of work so that those who are employed in those fields may continually be presented with the opportunity of intelligently keeping themselves in touch with the new demands, processes, and skills that the changing occupations make necessary.

No other one thing could so vitally and so completely affect the progress and the welfare of the trade and industrial workers as this one development now making such rapid headway in the field of vocational education. Let us not be satisfied until every worker in every industry may have the opportunity of self-advancement and self-improvement in schools that are within their reach in location, in time, and in cost.

—⟡—

HAND MINDED

In an address before the Oswego State Normal School, published in the October number of the *Vocationist,* James F. Barker, assistant superintendent of the Rochester schools, makes the following interesting statement:

"At the present time there are 1,200 boys and 200 girls in the junior high school for whom the practical arts are constituting a fundamental means of education. These children are hand minded—they learn by doing. Information, in this way, is acquired slowly, but once learned, hand processes are long retained."

It is evident that information may be imparted and received rapidly without the intervention of handwork by which the information becomes knowledge. In this day of much reading, and hearing, and seeing things that are not fixed in mind by personal experience, we become the victims of inattention. We read and hear and see incidental things with no attempt to understand or formulate information into working or usable knowledge.

Perhaps the most important idea of modern teaching is that children learn best that in which they actually take some physical part.

This idea has led to marked changes in the methods of teaching. Most teachers talk too much. The laboratory and shop method of instruction is rapidly taking the place of the text and lecture method.

The normal child is physically minded if not hand minded, and left to themselves children will learn by experiment.

Learning by doing may not be the only way of learning and it may be a slow process, but as Superintendent Barker states "hand processes are long retained."

Hand processes should, however, always be in part initiative and not altogether imitative. A reasoning process should be involved in all handwork. Persistent training in which mental and physical efforts are required, will develop the whole child and establish conduct and character with assurance of success in any one of numerous allied activities. It is well for all teachers of any subject to employ the distinct advantage of learning by doing.

—⟡—

LIFE IS LIKE THAT

What are the educational advantages of teamwork?

Well! One characteristic of teamwork is the obligation put upon each member of the team to play his part. Yes, but that is also characteristic of a machine.

But, teamwork is also cooperative; it is a poor teammate who does not help his fellows in a pinch. Life at best is cooperative rather than a survival of the fittest. The team is, therefore, a better symbol of life than the machine.

School competition has reached a point where the perfect machine is not the ideal team. The alert and resourceful opponent can "throw a wrench" into the smoothest-working machine on occasion.

Moreover, the perfect machine may have little ability in the way of "throwing wrenches" on defense. A good team must develop defense as well as offense. Life is like that! Life is a defensive as well as offensive game and the successful member of a team must be able to "throw wrenches" as well as to dodge them.

We seem to hear a pacifistic voice at this point in our soliloquy.

"Horrible! Horrible! The idea of suggesting that any school team throw monkey wrenches just because life is like that.

"The schools should not encourage such rowdyism. Your editor must be a football coach or a prize fighter."

No! The editor confesses to no greater station in life than that of a shop teacher, but attending a debate recently the editor was called upon to serve as judge. Under our judgment the best debating team won; we admit that much. The losing team was a perfect machine on offense but when it came to the rebuttal, the alert and resourceful team on the negative side, horrible as it may sound, threw so many wrenches into that affirmative machine, that they tore it to shreds.

A shopman-editor may get his metaphors slightly mixed and it may not be well to take him literally but you know what he means maybe.

Life is like that.

CORRELATING SHOP AND ACADEMIC SUBJECTS IN THE JUNIOR HIGH SCHOOL

T. P. Fiske, Atlanta, Georgia

THERE HAS BEEN a great deal said by teachers of industrial-arts subjects in regard to the correlation of their subjects with the other subjects offered in the curriculum. This correlation has never reached a very high state of success because the average teacher of English or spelling or mathematics cannot see the advantage of it.

It has been found, however, that correlation of the industrial subjects with the academic subjects can be successfully made. It has been found both feasible and profitable because the English department materially lightens the burden of the shop teacher if the correlation is carried out.

A successful method for the shopman is to choose a certain number of topics which are usually stressed in the shop, and write an outline of the work for the English department. This outline should contain a list of the topics with leading questions and references. The student who receives an assignment for a theme from this outline, reports to the teacher of English, either orally, or in writing, or the assignments may be used for socialized recitations, in which the entire class joins, each one adding to the recitation.

The method used in correlation with the spelling teacher is much simpler in its scope, but it is equally effective. A list of the most common words used in each shop is supplied to the spelling teacher with the definitions of the words. The children were assigned a certain number to spell and give definitions each day. I found that spelling in the shop classes improved almost 100 per cent.

The correlation with the mathematics department was even simpler than that with the English and spelling. We selected problems of interest to the boys in the various shops and supplied most of the problems in board measure, cutting paper, computing electrical-current consumption, measurements for the different types of roof construction and the cost of different thicknesses of tin from the actual problems on which the boys were working, or on which they would be working on when they passed into the next shop.

The following are a few typical English and spelling lessons:

Spelling List
Correlation with Electrical, Radio and Metal Shops

electricity	variometer	taut
volt	vario coupler	sheet metal
ampere	phones	metal
ammeter	resistance coil	center
voltmeter	alternating	scriber
asbestos	condense	mallet
antenna	insulation	square
battery	insulated	shear
cell	switch	solder
discharge	wire	rosin
charge	detector	flux
current	circuit	muriatic
converter	oscillate	iron
coupling	voltage	groover
core	audibility	riveted
code	diaphragms	lapped
aerial	transmitter	circle
cycle	cumulative	diameter
crystal	vibrate	angle
detector	oscillations	project
condenser	molecules	funnel
circuit	ether	seam
chopper	radiated	tin
copper	digression	pattern
induction	energy	plug
vacuum	vibration	cord
transformer	magnet	socket
armature	arc	buzzer
contact	zinc	electrolyte

Spelling List
Correlation with Printing

type	composing	typographic
printing	galley	design
gauge	metal	posters
composition	furniture	menu
elements	leaders	program
style	spacing	specifications
point	justification	instructions
quads	proofing	tabular
spaces	correcting	cover
font	planer	imposition
family	tweezers	embossing
leads	distribution	press
slugs	border	chase
case	display	

Typical English Assignments as They Are Worked Out for the Students

Theme I

Shellac

The purpose of this theme is to make you interested and familiar with one of the most widely used articles in wood finishing. Shellac probably has more uses than any other wood-finishing material

Leading questions:

Where does shellac come from?
What is it that causes the tree to give up its sap?
Why is the lac tree worshipped by the Hindus of India?
What is stick lac?
What is seed lac?
Why do we call it shell-lac?
With what is shellac mixed to make it a liquid?
How is it used?
What is it mostly used for?
What are other uses to which it is put?
In what two colors is shellac made?
What makes the story of shellac so interesting?

References:

Any encyclopedia
Any book on wood finishing
The Book of Knowledge
You will find all of this material at the public library.

Theme II

Paints

Leading questions:

What is a pigment?
What is a vehicle as used in paints?
What is linseed oil?
What is turpentine used for in paints?
What is drier used for in paints?
Why do we paint wood?
What is the difference between a paint and a stain?
What is the difference between a paint and a varnish?
How is paint applied?
How is white lead made?
How are colors made from clay?
How could the Indians paint their bodies when there were no paint stores from which to buy paints or colors?
What are coal-tar colors?

References:

The story of paints and painting is found at the library under the following different heads:

White lead
Linseed oil
Turpentine
Colors
Coal-tar colors
Pigments

Theme III

Turpentine

Leading questions:

What is a turpentine still?
From what tree does turpentine come?
How is the sap changed to turpentine?

What is left after the turpentine is extracted?
What is rosin used for?
What are the uses of turpentine?
In what states is the turpentine industry especially valuable?
How is turpentine drawn from the tree?
Name three uses of turpentine.

References:
Look under the head of turpentine in any encyclopedia at the public library.

Theme IV

Solder
Leading questions:
What is solder?
From what is it made?
How is it used?
What part does it play in your everyday life?
Name ten articles at home on which solder has been used.
Why are acids used in the process of soldering?
What is salamoniac?
For what is it used?

References:
The Book of Knowledge
Any encyclopedia
Special books on sheet-metal work

Theme V

Lettering
Leading questions:
What two types of letters are used in mechanical drawing?
What is a lettering triangle?
Where are small letters used?
Where are capitals used?
Why is lettering used in mechanical drawing?
Use illustrations in this theme.

References:
Frenche's Mechanical Drawing
Any drawing book

Theme VI

The Story of Electricity
Leading questions:
Who discovered electricity?
How was it discovered?
What is electricity?
Name ten uses of electricity.
Tell what is meant by series circuits.
Tell what is meant by parallel circuits.
Who discovered the electric-light bulb?
What kinds of bulbs do we have?
What is the use of the fuse?
What is a socket?
What is a switch?

References:
Any encyclopedia
Any book on electricity

PREVAILING ON BOYS TO READ AND UNDERSTAND INSTRUCTION SHEETS

J. W. Bollinger, Tulsa, Oklahoma

"CAN'T YOU READ THE JOB SHEET? Do what it says there!" exclaims the irate instructor. "Pupils don't understand what they read." "Pupils can't follow directions." "Pupils *will* not read the job sheets." These are some of the pet complaints that can be heard.

Well do I remember a certain young man, who had a strong voice and who would use that gift in giving vent to the above exclamations. Day after day, his patience would be taxed by the seeming inability of some youngster or youngsters to comprehend his carefully written directions. Now this shop-teacher went about using his job sheets in the following manner: First he would write up his directions, often without first having made the article himself, in a language such as he would use in telling an experienced adult how to do the work. Then he would tack his lesson on the bulletin board, in the shop, call the boys around and introduce the new job sheet. Perhaps a hasty verbal description of the project, accompanied only occasionally by an isometric drawing, and rarely by a first-class completed project, would be all that he considered necessary to start the pupils on the job. Then this instructor would sit down at his desk and occupy himself at working up other job sheets, or in marking drawings, etc. Often, when a boy came to him with a question, he would send him back again to the instruction sheet. I have seen him lead some boys there in a manner by no means gentle. In most cases, these boys did not succeed in getting the information wanted from the sheet, but would get help from the brighter pupils, and so make progress.

In short, this instructor attempted to *compel* his pupils to read the job sheets. It must be admitted at once that his method gives but very meager results, to say nothing of the attitude it creates. The question to be considered should be restated thus: "How can boys be *educated* to *read* and *understand* job sheets?"

Before pupils are asked to study job sheets, it is highly important for the instructor to study what he is going to put into his instruction sheets. Several types of such sheets are now on the market, and it might be instructive to consider some of these. One type attempts to arouse the interest of the boy by presenting the job in a very attractive manner. Tustison's[1] job sheets belong to this class. Still another type begins by setting up a problem situation by presenting a series of interesting questions, the solution for which is to be found in working out the project. Bedell's[2] job sheets are of this order. A third class is that which might be called a "direction" sheet, saying "do this," then "do that," etc. The projects got out by the South Bend Lathe Co.[3] are written up in this fashion.

Much can be said for each of these types of sheets, and it rests largely with the instructor, which model he chooses to follow. A few general observations may not be out of place here, however.

A neat, attractive-looking, illustrated paper is more attractive than just a plain-looking typewritten sheet. Wherever sugar-coating can be resorted to, without making the work too easy, it might be well to use some sugar. Pupils do not seem to care to read too much lengthy description or theory; this sort of thing is best presented or developed by the instructor orally, or by means of a standard textbook. Much the same may be said for questions; pupils are "scared off" by too many questions. A live working out of such questions in class does much better. One pupil, answering my questions as to why he didn't read the job sheet, said: "Why should I read all that stuff, when you can tell me the answer right away?" Evidently, when a pupil goes to an instruction sheet, he wants to find an answer to his question quickly. Summarizing, job sheets should be accessible; clean and readable; attractive; illustrated; and contain just what is wanted, concisely stated and easy to find.

Now, as to how to use the job sheet after it has been made. Obviously, the method employed by the instructor

[1] F. E. Tustison, "Job Sheets in Home Mechanics"; Bruce Publishing Co.
[2] Earl L. Bedell, "Job Sheets in Home Mechanics"; Manual Arts Press.
[3] South Bend Machine Shop Course; South Bend Lathe Co., South Bend, Ind.

cited above, is all wrong. The procedure described below will be found to work: *When introducing a new job or procedure, which is to be accompanied by a job sheet, give a pupil the job sheet, to be read one item at a time, while the instructor does exactly what the job sheet calls for.*

During the first part of the semester, practically all job sheets will be introduced in this manner. Later only certain portions of the sheets will need to be introduced in this way. For any complicated procedure, such as riveting sheet metal, first use of the plane, etc., repeat the above procedure, except that a *pupil* is to follow directions as read from the job sheet, instead of the instructor. Give opportunity for criticism of this pupil's work. Later in the semester, sheets are to become briefer and briefer, so that the pupil may use more and more of his own initiative in working out the project. The last few papers may be just plain statements of projects.

Students should be instructed to: *Consult the job sheet first; if this does not answer, consult the instructor.*

The plan that has been outlined, has the following advantages:

Repetition of the process of referring to a job sheet soon makes it a habit. It becomes easier and easier to go to a job sheet.

Pupils actually see that the instruction sheet *does* contain the information they are looking for, and they quickly develop confidence in what is stated there.

Going to the job sheet will constitute a rapid review of what has been gone over, and will offer no particularly new difficulty.

After several semesters of this sort of instruction, pupils will learn to read instructions and to follow directions correctly, with but a minimum of help from the instructor.

PRESERVING THE CRAFTSMAN'S PRIDE

Edwin Stodola, Kingsport, Tennessee

In these days of automatic machinery, intensive division of labor, and mass production, the existence of that spirit of medieval days, when individual trade pride had developed almost into a fetish, is threatened on every hand with extinction.

While this tendency exists today throughout all industries where handwork has been superseded by machine production, in none is it more marked than in the bookbinding and printing trades. As the numerous operations required for completion of the finished product are divided more and more among many individuals in a large edition plant, it is becoming increasingly difficult to safeguard this ideal.

HAND COMPOSITION AND PRESSWORK SECTION OF THE KINGSPORT PRESS VOCATIONAL SCHOOL.

The Kingsport Press, of Kingsport, Tenn., thoroughly realizes this situation. In building its vocational school around the ideal of creating and developing this trade pride in the minds of the students who are being trained for employment in its plant, it shows its progressiveness and farsightedness. It realizes that if quality of workmanship is to be fostered, this spirit must be preserved at all costs.

In line with this purpose, the primary aim of the vocational school of the Kingsport Press is to develop in the individual student a knowledge of all the operations involved in making a book, rather than to create specialized manual skill in any one operation; the latter can come only with long experience and constant repetition.

On the other hand, instruction in the vocational school is not restricted to the theoretical aspects of bookbinding. The intent of the school, as well as the desire of the student, are both practical. It is expected that when the student has finished the course, which consists of six months' intensive training, he will be sufficiently qualified for productive work in the plant to earn the wages which will be paid to him.

A CORNER OF THE BOOKBINDING DEPARTMENT, KINGSPORT PRESS VOCATIONAL SCHOOL.

Keeping this practical aspect in mind, all students are required to spend half time in the plant and half time in the school. In this way they not only become familiar with the productive operations, but they also learn how to adapt themselves to the discipline of a large plant. As would be expected, under this scheme, by the time the course has been completed, the transition from school into full-time employment in the plant becomes a most simple and natural one, barely realized by the student himself.

But aside from its training and quasi-cultural advantages, the school has been found to be of great benefit in a practical way as a source of vocational guidance. One of the important responsibilities of the school authorities is to study each individual student and to determine whether or not he is of the type fitted for the work which he is undertaking. Before being admitted to the school, each applicant is given a careful examination, including a mental test, and if found qualified, he is accepted on probation. If after a reasonable time it is decided that he is not of the type fitted for the work, he is advised to withdraw from the school. As the apprentice, who has been accepted after finishing his probationary period, progresses, his work is carefully observed both in the school and in the plant, so that by the time he has completed his course, he can be intelligently assigned to that department of the plant for which he is best fitted.

Boys and girls under twenty-one years of age, who have completed a high-school course are eligible for admission. In addition to free instruction, they are paid apprentice rates, which are gradually increased during the six months they spend in the school. The payment of wages serves not only as an incentive to the student, but it helps him to meet his expenses and incidentally entitles him to compensation under the state law in case of accident, on the same basis as a regular employee of the plant.

One of the most difficult problems which the school has faced, but which it is hoped has now been adequately met, has been the preparation of a curriculum for the bookbinding course. When the school was established about two years ago, it was realized that without such a curriculum, it would be difficult, if not well nigh impossible, for the school to accomplish its object. Careful investigation failed to bring to light any existing course of study in this subject which might serve as a guide in outlining our course. After considerable research and experimentation, the vocational school of the Kingsport Press succeeded in evolving its own course in bookbinding. A regular schedule of studies has been prepared, which covers all of the principal operations in binding, including folding, gathering, sewing, trimming, gilding, rounding and backing, headbanding, cover making, and stamping. Each student is

A GROUP OF STUDENTS RECEIVING PRACTICAL INSTRUCTION IN THE PLANT OF THE KINGSPORT PRESS.

required to finish certain prescribed manual projects, to attend lectures and to cover definite textbook assignments; all of this in addition to practical part-time work in the production departments of the plant.

Comprehensive manuals, copiously illustrated, explaining the technic of various operations, have been especially prepared and printed by the Kingsport Press, on the following subjects:

1. Linotype style and shop practice.
2. Proofroom procedure and practise.
3. Electrotyping.
4. Cylinder- and job-press work.
5. Bindery—Machine folding.
6. Bindery—Hand folding and pasting.
7. Bindery—Hand and machine gathering.
8. Bindery—Hand and machine sewing.
9. Bindery—Smashing and trimming.
10. Training course, junior executives.

Mr. E. W. Palmer, president of the Kingsport Press, is chairman of the educational-vocational committee of the Employing Bookbinders of America, and under his personal direcrection a "Textbook on Bookbinding" for vocational schools is being prepared for the Association. Much of the experimentation in developing a suitable curriculum and in arranging the sequence of studies has been the direct result of his research work in this and foreign countries.

With the exacting requirements for admission, it has been possible to build up a student body of high grade, many of whom will no doubt eventually become future executives in the plant. Another important factor in the school's development has been the generous support accorded by the state board of education of Tennessee, which has at all times cheerfully contributed its counsel and advice. Likewise, the action of the local school board in approving the courses in the Kingsport Press Vocational School as accredited subjects in the high-school course, has been of distinct assistance.

In the completeness of its equipment the school is especially fortunate. At present, this consists of dummy linotype keyboards, foundry type cases, racks and a liberal assortment of all modern types; imposing stones, proof presses, job presses, cutters and a full outfit of bindery tools and machines. An extensive library also is maintained for the use of the students.

Primarily, the school has been organized to train promising boys and girls who wish to enter the plant of the Kingsport Press. Yet, those already employed have not been forgotten. Special night classes both in printing and bookbinding are conducted for their benefit. A number of the more ambitious workers are taking advantage of this opportunity.

The school is young; it has yet many problems to solve, but its ideals are sound and practical. There is every reason to believe that as time goes on, it will fully justify its establishment and become a permanent and valuable adjunct of the Kingsport Press.

CRAFTWORK IN TOOLED LEATHER DONE BY STUDENTS UNDER THE DIRECTION OF W. R. FENTON, INSTRUCTOR OF INDUSTRIAL ART, NORMAL SCHOOL, SASKATOON, SASK., CAN.

PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine-shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration.

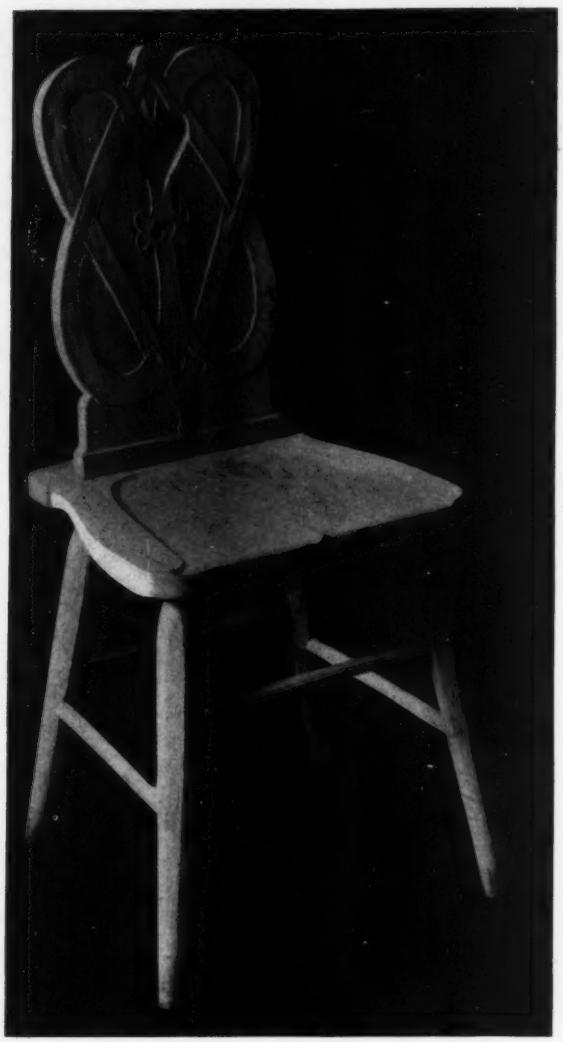
GERMAN AND ITALIAN RENAISSANCE CHAIRS

R. Forkel, The School of Industrial Arts, Trenton, New Jersey

The accompanying illustrations show original work made by students of the woodworking and crafts department of the School of Industrial Arts of the city of Trenton, N. J.

The students are required to make sketches and full-size drawings of their work, and the shopwork consists of a system of hand training, resembling very closely the training which was received by the old craftsmen. It is only through this training that we may hope to produce skillful workers who are comparable to the artisans of the past.

ITALIAN RENAISSANCE CHAIR, DESIGNED BY REINHOLD FORKEL, TRENTON, N. J.



GERMAN RENAISSANCE CHAIR, DESIGNED BY REINHOLD FORKEL, TRENTON, N. J.

Employing machines in schools is greatly favored by the students, as most of them want to get away from manual labor as much as possible, but even if schools employ machinery, the student should receive nothing but hand training for the first half of his shop course.

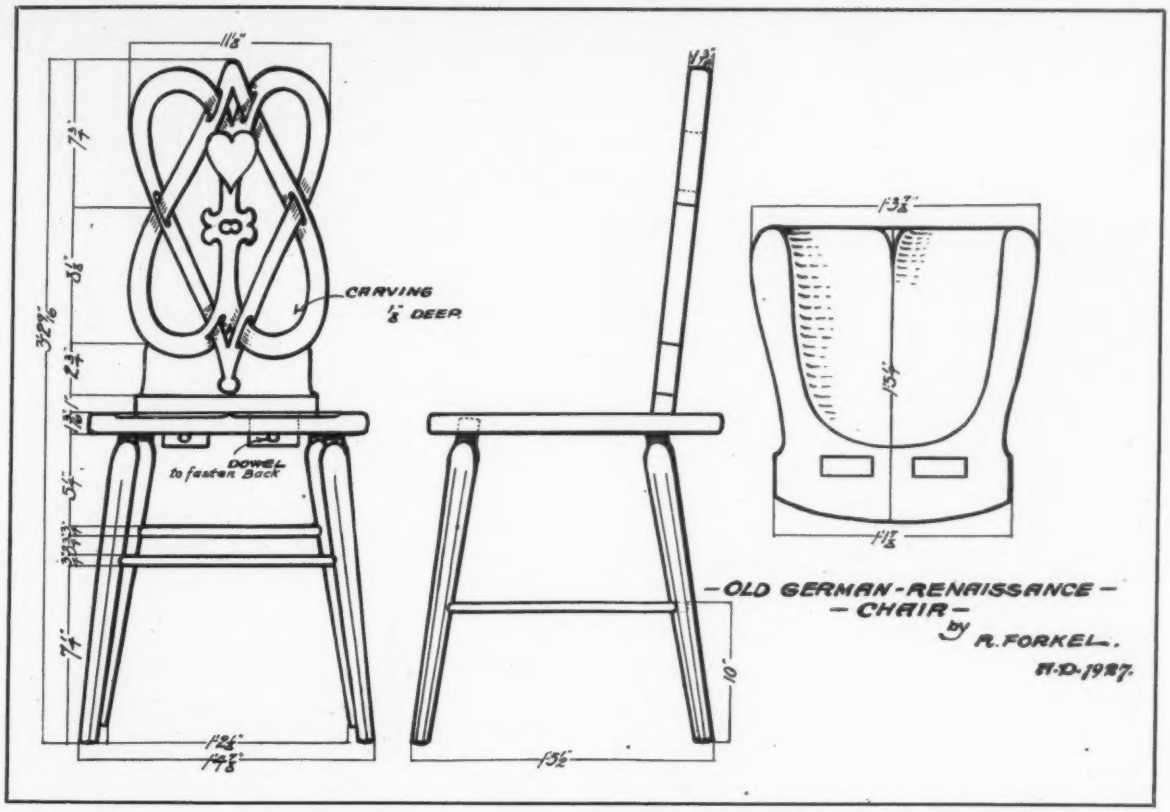
Educators who want to give the crafts more consideration in the schools will find that hand training is the first step to further it, as all fundamentals are embodied in this kind of training. Hand training trains the eye and the hands; it develops skill, independence, and contentment, and it creates appreciation for better things.

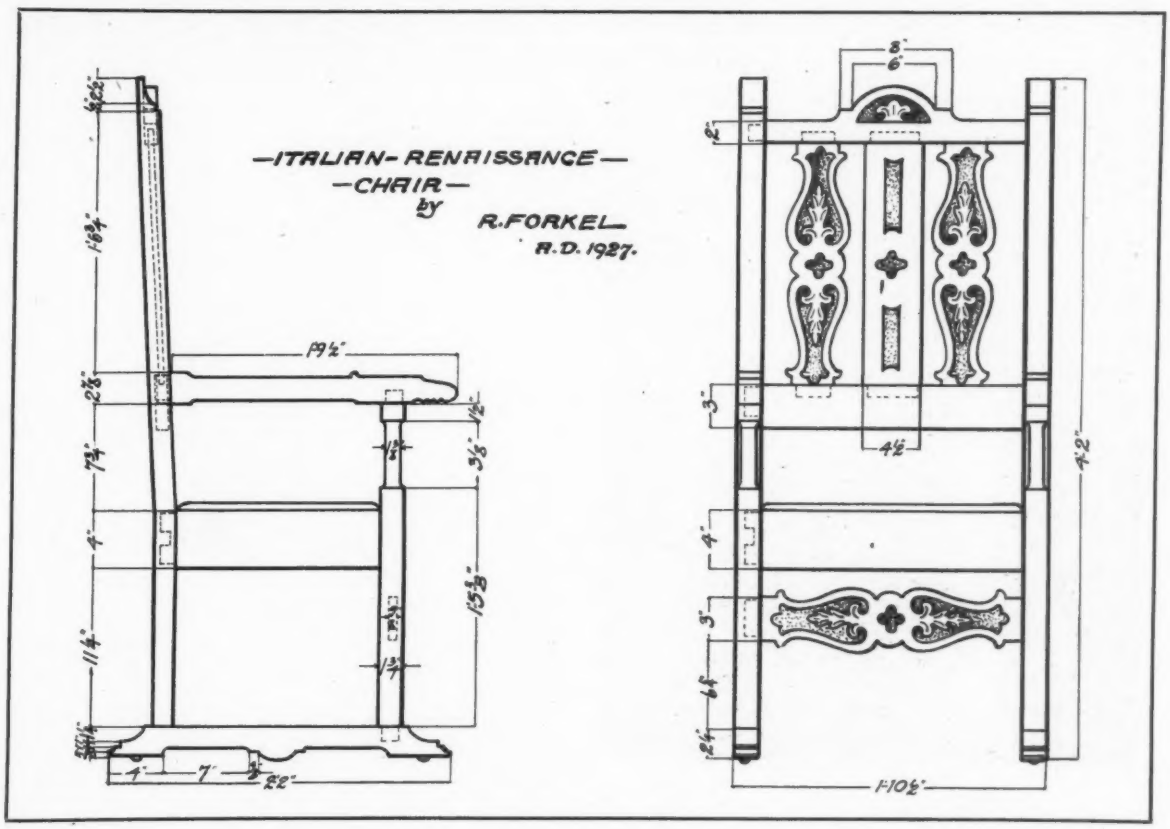
Work wrought by hand always has a certain charm. No matter how well a piece of work is produced by machine, people with artistic tastes and feelings will always look for the work of the old masters, and they are willing to pay any price for these antiques.

These old masters were not only craftsmen but designers and architects as well. Their work was prepared with the greatest care and they laid great weight on designing, which we overlook most of the time in our schools. They realized, in the early days, that construction alone would not encourage selling, but that well-proportioned and well-designed pieces received first consideration.

The German Renaissance chair is a design copied from the fifteenth century. No doubt it will inspire the lover of furniture. Here one can most clearly notice that design improves the work. The handwork on the back is simple but very artistic and gracefully arranged. Equally pleasing is the nice outlining of the saddle seat. The lower part of the chair was changed somewhat from the original design. It was thought best to add spindles between the legs to strengthen it. This chair was constructed of oak, stained light brown, filled, varnished, and rubbed.

The Italian Renaissance chair is also of a very pleasing design. The decoration is simple and carving helps greatly to preserve the character of the Italian period. The seat has been changed from tapestry covering to a simple leather seat. The chair is constructed of oak, stained light brown, the background of the carving is made a little darker, it is filled, varnished, and rubbed.


CARVING
DOWEL
to fasten Back
—OLD GERMAN-RENAISSANCE—
—CHAIR—
by R. FORKEL.
H.D. 1927.


—ITALIAN-RENAISSANCE—
—CHAIR—
by
R. FORKEL
H.D. 1927.

THE GARAGE AS A CARPENTRY PROJECT

H. H. Braucher, Associate in Industrial Education, University of Illinois, Urbana, Illinois

The need for a small building as a practical project for carpentry instruction may be supplied in most localities by the use of the garage. Larger projects are difficult to handle and in small communities are really prohibitive. Anything smaller than a single garage, however, does not furnish typical construction problems to meet the needs of the class.

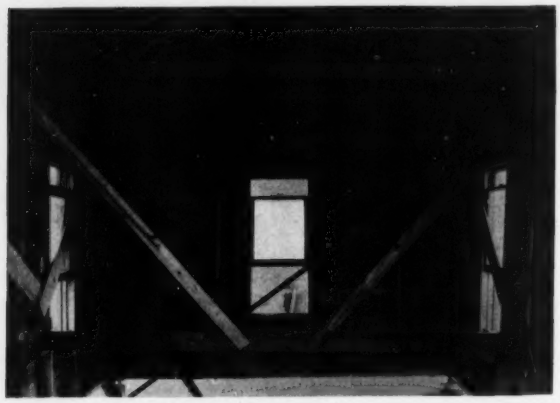


FIG. 1. THE GARAGE WITH BRACING IN PLACE FOR MOVING.

The plan of procedure will of course vary with the conditions in the community. The following plan was used successfully for several years. After the organization of the class, time is given for discussing the problems of the home builder. The selection of the site, the arrangement and planning of the rooms and other features, the style of architecture, the design of exterior and interior trim, built-in millwork, etc., are each taken up. Practice is given the students to design and plan a home of their own choice, using books of designs and plans for reference. As the planning progresses, difficulties are pointed out, and the dangers of building according to untried or carelessly drawn plans are emphasized. It is pointed out that the cost of corrections may more than equal the fee of a skilled architect for drawing the plans correctly.

While this preliminary work is being done, the question of the garage to be built is considered. If possible, arrangements should be made to build a garage for some home owner so that there is a definite location and set of surroundings which must be taken into consideration in the design. This accomplished, the next thing is to determine the size, style of roof, kind of material, location of door or doors, windows, trim, cornice, etc. This makes the problem concrete and adds to the interest of the work by stimulating some rivalry in making a design which will meet all of the requirements in the most satisfactory manner. It is not simply the building of four walls and a roof, with windows and doors placed arbitrarily, but it is a problem of building for a purpose, where each feature is designed and located with the aim of making it harmonize with definite surroundings. Lack of appreciation of harmony and the fitness of features of design are the causes of all of the misfit buildings that jar the sensibilities of those who appreciate good taste in constructional design. If the site is convenient enough, the work may be done on the ground. If the site is too far away from the school, the millwork and framing may be done at the school shop, and the building assembled upon the foundation as a "ready cut," except that the sheathing and siding would best be cut and fitted after the framework has been put up. But if the garage is not too large, perhaps 12 by 18 ft. or 14 by 20 ft., the garage may be assembled completely on a temporary foundation conveniently located to the school shop. After it has been completed, it is then moved to the permanent site. This will save time going to and from the work, and the moving of the small building is really a very simple matter.

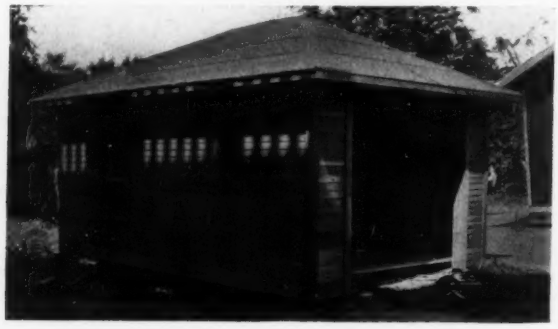


FIG. 2. THE GARAGE PARTLY RAISED, PREPARATORY TO PLACING IT ON THE AUTOMOBILE TRUCK.

Besides the planning of the important parts such as door and window frames, cornice, and other items of trim, the work of estimating the materials and determining cost should be included. A complete analysis of the job with the proper organization of the work to insure efficient progress may be included. Stimulation of observation may be secured if the individuals of the class are required to visit other buildings to determine how some things are to be done, or how else they might be done if there is a choice. This will be of real value to the boy afterward, and is a much better method than if the instructor is too ready to tell how the work should be done.

After the millwork is finished, the framing is begun. In this the problems of the roof are most important, and the uses of the steel square in the solution of the problems arising in the roof construction are perhaps the most profitable of all of the work. Cutting of studs and plate, as well as framing about doors and windows involves only very simple work, but the framing of the roof by the use of the steel square is sufficiently complicated to challenge the attention and hold the interest of the best students for some time. To make the problems typical and varied, the style of the roof should be more complicated than the double gable roof. At least one "hip" should be included. If the design will permit, a dormer, or a side gable would help to make the roof a real problem by adding features not included in a plain hip roof. Sometimes interest is added by using the "snubnose" gable. This may help to secure headroom over the door, or doors, to permit of proper trussing. This is especially true if one uses the double garage with a wide door opening. The truss gives ample strength, and the snubnose adds difficulties and design characteristics that are worth considering where it can be used appropriately.

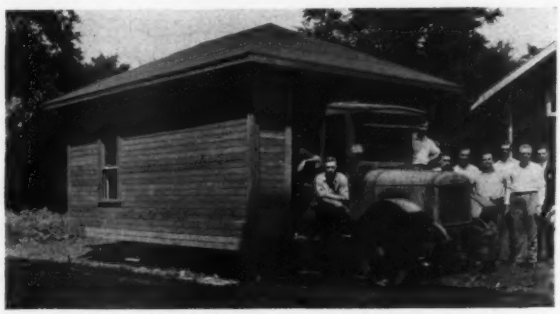


FIG. 3. THE GARAGE LOADED ON THE TRUCK.

Financing the project involves some business enterprise. The cost of the materials for the structure will amount to from $100 to $200, according to the size and type of garage desired, and the quality of material and trim chosen. The simplest method is to arrange with some patron of the school to take the building when finished, at a figure that will cover at least the cost of materials. If the school authorities can create a rotary fund for the purpose, the money may be used for buying the materials. The proceeds from the sale of the building will then replenish or perhaps increase the fund.

Delivering the Garage

After the garage has been finished, the next problem is to get it ready for moving. This is comparatively simple for a garage of moderate size. Figure 1 shows how a 12 by 18-ft. garage was made ready for loading. The truss of 4 by 6-in. yellow pine with 2 by 4-in. braces carries most of the weight, and a 2 by 10-in. joist supports the remainder. This proved ample in our case. The bracing and blocking is of the utmost importance, and involves the intelligent application of the principles of mechanics and construction.

After the bracing has been put into place, loading is relatively simple. The building is raised with pries or jackscrews, and blocked when high enough for the truck platform to enter under the truss. The truck is then backed into position and the building is lowered into place after the front carrying truss has been put into position. When loaded, everything must be secured and blocked to prevent side shifting en route. If all of these details have been carefully attended to, the trip may be made easily and safely if the roads or pavements are fairly good.

The record of our experience may be of interest. The building was in readiness when the class assembled at 1:00 o'clock for the final effort. The truck arrived at 1:10 and was backed into place after a

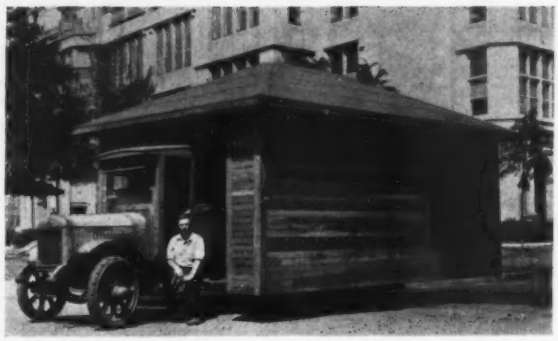


FIG. 4. THE GARAGE ON THE WAY TO ITS DESTINATION.

few minutes work at raising the garage high enough to clear the truss above the truck platform. Figure 3 shows the progress of the work at 1:40 with some time allowed for photographs, while Figure 4 shows building on the truck and started on its trip of three miles to the site where it was unloaded on its foundation. The unloading was readily accomplished by the truck driver.

The bracing was then removed and reloaded on the truck, and the return trip was made, the truck unloaded and discharged at 3:15. The entire job had been completed in 2¼ hours. The method described in the foregoing is not new, nor is it original. It is simple and efficient, however, and it gives a good opportunity to give instruction and practice in a type of organization that must always accompany any kind of undertaking where safety and efficiency are important factors.

A JOB SHEET FOR THE UPHOLSTERING CLASS (A TIN-CAN HASSOCK)

Herbert Bast, Sheboygan Vocational School, Sheboygan, Wis.

Odds and ends of upholstety covering are continually accumulating in the upholstering class. These can be used for covering small stools, and the like. Boys want something of this sort, too, but it must be inexpensive, as the boys in the vocational school cannot usually afford to pay for high-priced articles. In order to get rid of such an accumulation of remnants, the first thought was to sew them together and fill them with stuffing for hassocks. This made a heavy and bulgy construction, however, and required a lot of stuffing. To lighten them, and to conserve stuffing, the idea of using empty tin cans as an inside frame was tried out. A model was made and the boys became interested at once. They brought cans of all descriptions and sizes. Each set of seven cans, of course, had to be of equal size. As the remnants were small, we had to, in most cases, use different material for the top and the sides. The colors, however, were chosen so that they harmonized and the welts were usually made of a contrasting color. This type of hassock may be used for various purposes as foot rests, porch seats, and occasional seats for children. When they are covered with goods to harmonize with the furniture or rugs, they are not only useful but ornamental as well. When made as described in this job sheet, they are light in weight, can be easily carried to any part of the house or porch, and they retain their shape without sagging or bulging.

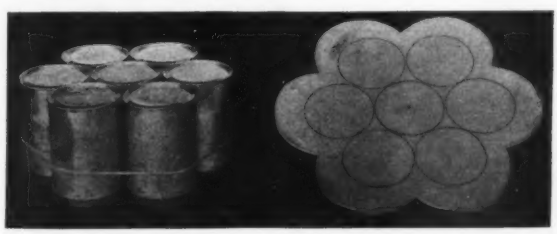


FIG. 1. FIG. 1 SHOWS HOW THE CANS ARE TIED TOGETHER.

FIG. 2. FIG. 2 SHOWS HOW THE BASE BOARD IS LAID OUT.

Tools and Equipment: Hammer, shears, sewing machine.
Materials: Wood for base, seven cans of equal size, tacks, stuffing, muslin, cover, cambric, cord.
Procedure:

1. Selecting cans for stool. (Fig. 1.)
   a) Seven cans are necessary for this type of stool, but they should be the same size in height as well as in diameter.
   b) It is preferable to have the covers on the cans as this will add strength to the stool, making it more rigid.
   c) The size of cans is determined by the size of stool wanted.
2. Selecting and cutting wood base. (Fig. 2.)
   a) The wood base should, if possible, be of one piece. Where a large stool is wanted, a few boards can be put together, but these should be of equal thicknesses so the cans will stand even on the base.
   b) To get the correct size and shape of wood base, place one can directly in center of board and mark all around, place the other cans all around this center line and mark around each can.
   c) Allow 1 in. from outer line of cans and cut to shape, this will make six distinct scallops of equal size.
3. Fastening cans to wood base.
   a) Place cans in their proper places, tie a piece of cord all around them keeping one of the cans in the center.
   b) Place a few tacks at the outer edge of each of the outer cans. This will not permit the cans to move about and get out of place.

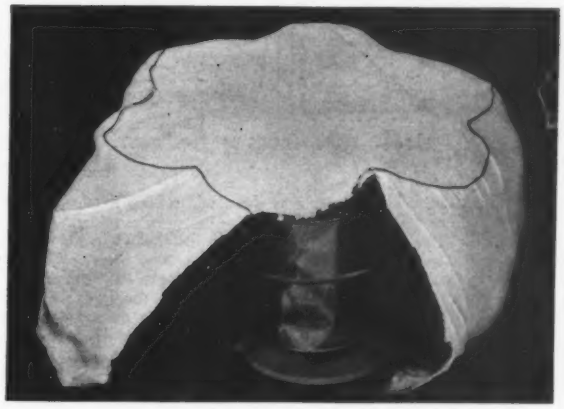


FIG. 3. STUFFING THE HASSOCK.

4. Cutting muslin for the casing.
   a) Place the wood base on muslin and mark all around.
   b) Allow ½ in. for sewing and cut out to shape.
   c) Cut a piece of muslin for the border. The length of this piece will be determined by the circumference of the top piece. Its width will be determined by the height of stool that is to be made. A number of pieces may be sewed together to obtain a piece of the proper length.
5. Sewing muslin casing.
   a) Sew the border to the top piece, taking care to sew it at the same distance from edge all around so that the top piece will keep its original shape.
6. Stuffing the hassock. (Fig. 3.)
   a) Place the stuffing evenly on top as well as around the sides of the cans.

FIG. 5. THE FINISHED HASSOCK.

   b) To keep stuffing in place, tie a piece of cord all around and over the top.
   c) Stretch the muslin casing over the stuffing, and tack the muslin to the bottom of the wood base.
   Note: Care must be taken so that the scallops in the muslin will be even with the scallops on the wood base, and that the same height is maintained all around.
7. Cutting the covering.
   a) Place the wood base on the covering material and mark all around.
   b) Allow ½ in. for sewing and cut out to shape.

c) Cut a piece of cover material for the border. The length of this piece will be determined by the circumference of the top. Its width will be determined by the height of stool that is to be made.

d) Cut one strip 1½ in. wide for the welt. This must have the same length as the border.

8. Sewing the covering.

a) Prior to sewing the top and border together, a cord is covered with fabric. This covered cord is called the *welt* (see Fig. 4), and is inserted between the edges that are to be sewed together.

b) Join border to top with welt all around.

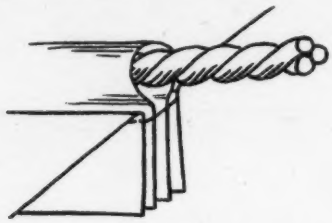


FIG. 4. THE MAKING OF THE WELT.

9. Covering the hassock.

a) Stretch the cover over the stool, tacking it to the bottom of the wood base.

Note: Care must be taken so the scallops in the covering are even with the scallops in the wood base and that the same height is maintained all around.

b) Tack a piece of cambric underneath the base, turning in the edges all around. This will cover the wood base on the bottom as well as prevent the fraying of the covering.

DESIGN AND APPLICATION OF MOLDINGS

L. F. Hyatt, McKinley High School, Canton, Ohio

Even though it be of simple design, much can be added to the dignity in appearance of furniture if the moldings are of good proportion, have pleasing outline, and are properly placed. Moldings, as we have them today, are greatly influenced in their design by the classic moldings. It seems as impossible to create moldings free from this influence as it does to create a piece of furniture free from the effect of the old masters, or to build a house that is not akin to the Doric, Ionic, or Corinthian.

It is the wish of the writer to acquaint the student in the high-school shops with some of the things governing the selection, design, and use of moldings as they are encountered in the average school shop. In Figure 1 is shown a group of eight moldings which have affected the development of moldings through all their subsequent stages of development until the present time.

The *fillet* is a narrow, flat surface which may be either above or below the surface of the molding proper. When below it is called a sunk fillet.

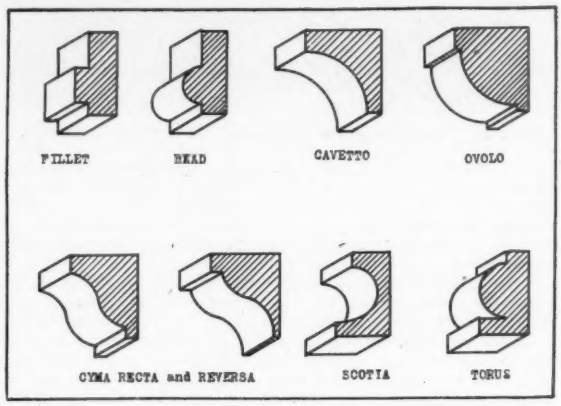


FIG. 1. COMMON MOLDINGS.

The *bead* is a half-round molding either projecting above, or even with the surface. In the latter case it is called a quirk bead.

The *cavetto* is a hollow molding having an outline which is not more than a quarter circle, and the *ovolo* is simply the reverse of the cavetto. These are not necessarily circular in outline as any curve may be used.

The *cyma recta,* commonly called the ogee, has a profile composed of two arcs, concave and convex, having the hollow at the top. The crown member of cornices is usually made with this molding.

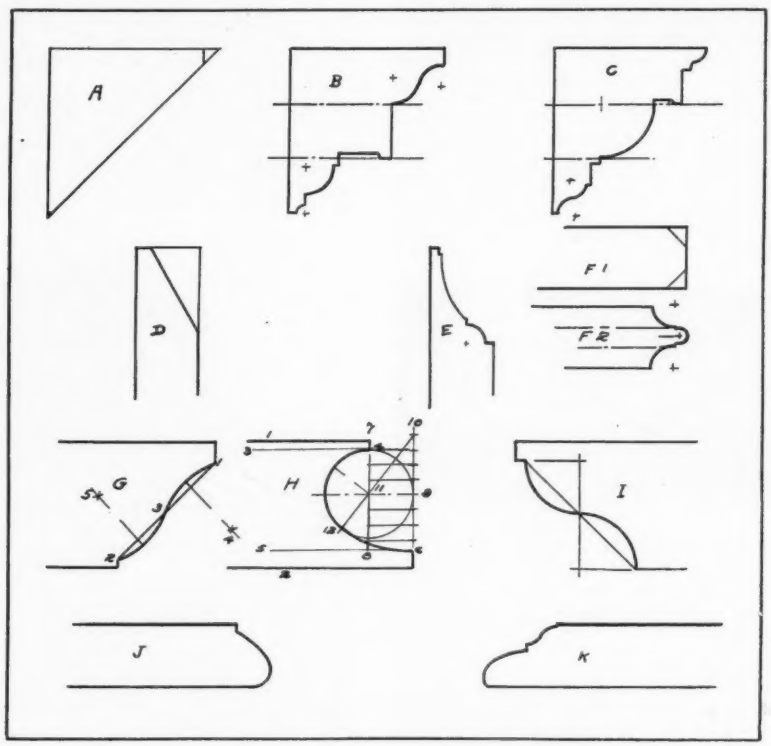


FIG. 4. SUGGESTIONS FOR DESIGNING MOLDINGS.

The *cyma reversa* is the reverse of the above as shown at I, Figure 4.

In the *scotia,* often called the thumb molding, the hollow section is composed of two tangent arcs different in radii.

The *torus,* sometimes called the bed molding, is a large convex molding having a semi-circular profile.

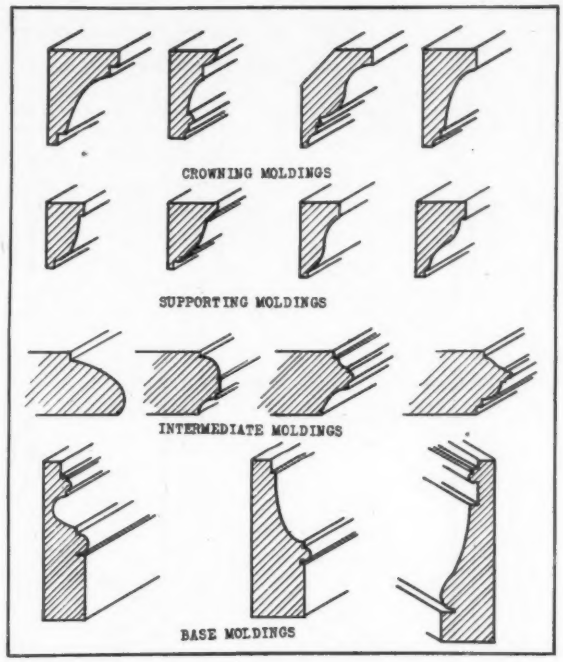


FIG. 2. THE FOUR CLASSES OF MOLDINGS.

Moldings as we have them related to everyday use in our school shops may be divided into four groups as shown in Figure 2, crowning moldings, intermediate moldings, supporting moldings, and base moldings. In Figure 3 are shown the moldings correctly placed relative to the position of the eye. These moldings may be designed in accordance with the designer's tastes, but a safe rule for nearly all moldings which are to be placed 6 ft. above the eye, is to allow the general outline to slope 45 deg. upwards and outwards from the lowest point, Figure 4A. The base molding is seldom allowed to slope far beyond the carcase proper, the reason for this being the danger of injury to the cabinet by the feet striking the base. D and E, Figure 4, shows the general outline in designing this molding.

Many show cases are made with what is known to the cabinet-maker as the receding base. This is done to prevent the base from being marred by the feet striking it as a person approaches. An illustration of the use of a molding of this kind is shown at A, Figure 3, and this is about the only occasion for the use of a molding of this kind below the level of the eye.

The artisan is often required to design a crown or cornice molding. This is done by dividing the height into three equal parts, always allowing the intermediate part to be a vertical line, in striking contrast to that portion above and below this part. If, on the other hand, another type is desired, any bold curve, as shown at C, Figure 4, in contrast to the flat surfaces, and fillets above and below may be used. These principles of contrast and proportion should govern the designing of all moldings. In Figure 3 are shown three faulty contours, which should always be avoided in the designing of moldings. Care should always be taken to have adjacent curves broken by a straight line, being careful to preserve the unity of outline, as indicated by the dotted lines at B, Figure 3, and to have the curves cut each other as nearly at right angles as possible. As an aid to the student who is not acquainted with the methods of designing moldings the following formulae will be found helpful: For the *cyma recta,* G, Figure 4, draw line 1 and 2 and bisect it at 3. With centers 1 and 3 and 3 and 2, strike locating points 4 and 5 then draw the arcs for the curve of the molding. For the *cyma reversa,* the same methods are used only the curves are drawn the reverse.

To draw the *scotia,* H, Figure 4, draw the lower and upper horizontal lines, 3 and 4, equal to the desired fillet at the top, and 5 and 6 equal to the lower fillet. Next draw a perpendicular line, 7 and 8. Divide this line into seven equal spaces. Using the fourth division, draw the circle as shown, next draw the perpendicular line as shown at the right and tangent to the circle. Make 9-10 equal to 9-6 and draw a line of indefinite length through the center intercepting the circle 10-12. With a radius equal to the distance 10-12, draw the arc 12-6 and the molding will be completed.

In designing intermediate moldings it is customary to divide the thickness of the material into three equal parts as shown at F1 and F2, the corners being cut off at approximately 45 deg. angles. These moldings are used on about the level of the eye when the observer is seated. Often it is desired to give the appearance of thickness or thinness to the tops of tables and intermediate moldings. This is done by changing the profile as shown at J and K, Figure 4.

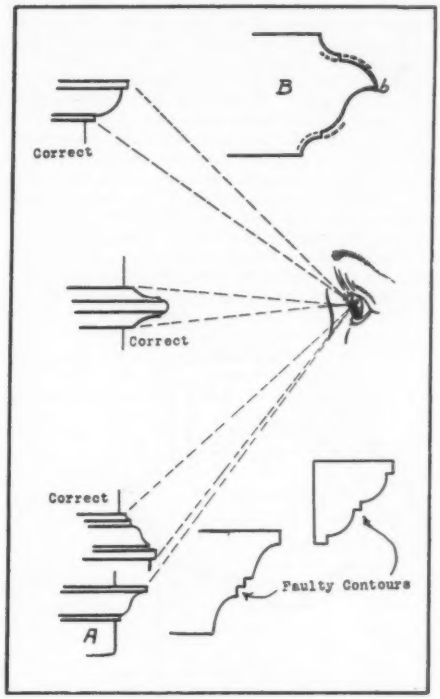


FIG. 3. THE VISUAL ELEMENT IN THE DESIGN OF MOLDINGS.

In the designing of moldings the material must be considered. If it is to be of a wood which is rare the molding may be less massive, thus saving cost. Moldings are usually a means of adornment rather than structural features, and much study is necessary to acquaint the student with the things governing the selection, design, and use of the various moldings.

A BENCH GRINDER

R. F. Davis, Hibbing Junior College, Hibbing, Minnesota

(Part 1)

(See Supplements Nos. 83 and 84.)

Occasionally one hears a rumor that machine-shop work in public-school curriculums is a dead issue. Some of us who happen to be machine-shop instructors, hasten to defend our pet occupation, and this is being written with the hope that it may wake up some of our lagging brothers who do not know that the machine shop can be made one of the biggest drawing cards in the school if it is turned into a live proposition.

In schoolwork we should put a value on time. We cannot justify the outlay of a boy's time on any exercise or project which does not have value in itself when completed. By this I mean that when we teach the operation of cutting a thread it should not be in the making of some abstract piece which is named "A Bolt," but it should be a bolt that is part of some machine or appliance which the boy can put to some use when it is completed. This keeps the boy's attention focused on the final test—does it fit? During the interval while the boy has been engrossed in this job, the skillful instructor will have had an opportunity to teach uses of metals, uses of bolts, kinds of threads, fits and tolerances, uses of measuring tools, machine operation, etc. Few boys would want to throw out their chests and proudly say, "When I took the machine-shop course I made a bolt"; but they might take pride in pointing out bolts which they had made, and which were being used on a machine which was used

for some purpose or other. Schools may display an assortment of highly polished exercises, each bearing a label with a boy's name, but if these exercises had any practical value, the boys would not have left them to gather dust in the shop where they were made.

This article is an attempt to present a problem suitable for beginning students which contains a large number of fundamental operations. It will be found also that each operation is of increasing difficulty, and there is no material wasted on mere practice work. Furthermore, the project has considerable value when completed, and we have never found a boy who would part with a finished grinder. The ability and accuracy of the student is all visually summed up when the machine is finally assembled and tested. We are allowing thirteen weeks for the completion of this project but the time may be looked upon as being rather elastic, varying with the equipment, length of shop period, etc. The following is a description of our methods of making each piece and the order in which they are made. No special jigs or fixtures are used.

Several simple patterns will be required for the case, cover, crank, and the large gears. The pattern for the case is split through the bearing bosses and stiffening web. A half-core box is required for the balanced core which is used. The shaft holes are not cored as it is much easier to machine the holes accurately when the metal is allowed to remain solid, and the saving in metal would be very small. The cover is a one-piece pattern. The crank is a split pattern. The gear patterns are plain disks. If the castings are to be purchased from a local foundry it will reduce the cost if six or eight gear patterns are mounted on a molding board.

We start the work with the wheel spindle, teaching the identification of cold-rolled steel, measuring, sawing stock, laying out centers,

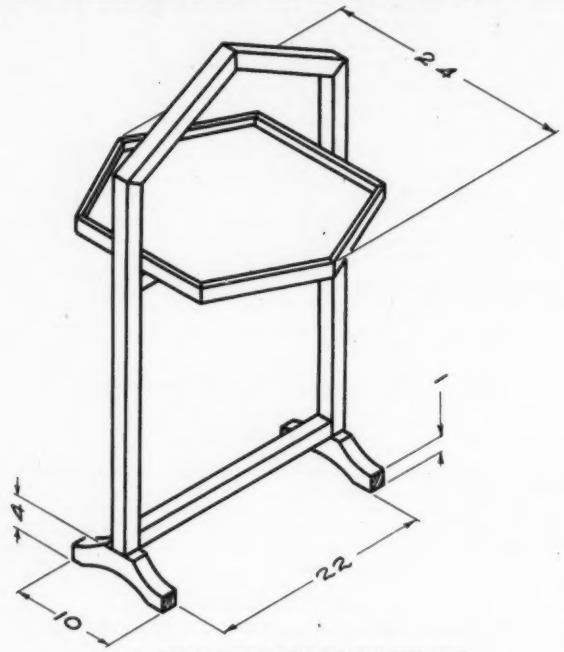


FIG. 1. TRAY TOP TABLE READY FOR USE.

drilling center holes, and plain rough turning in the lathe. The spindle has a lot of stock to be removed which gives the boy a chance to get acquainted with the lathe. This piece is roughed down to within ⅛ in. of the finish size, then it is laid away while the practice of turning to accurate dimensions is done on cheaper stock.

The drive shaft is next cut to length, centered, and finish-turned to size, but not threaded. This is now laid away.

The clamp screw should now be prepared for the lathe and on this piece the boy cuts his first thread. This piece is very well suited for a beginner as the stock is inexpensive, and some latitude may be allowed for the termination of the thread. It is expected that some of these pieces will be spoiled in cutting the threads, however, the spoiled part should not go into the scrap box as it will still finish into either a handle screw or a clamp bar.

After having successfully cut a right-hand thread on the clamp screw, the student should finish, turn the wheel spindle and cut a left-hand thread on it. This thread cannot be cut with a standard die so it serves to drive home the usefulness of the lathe for cutting threads.

The third and most difficult job of threading up to a shoulder should now be attempted on the drive shaft. All of the lathe jobs up to this stage have been done on centers. The following jobs involve the use of the chuck and it is suggested that independent jaw chucks be used rather than universal chucks as we find that students who have seen universal chucks believe that the only way to get a cylindrical object running true is by the use of such a chuck, and they become afraid to tackle a simple truing-up job in an independent jaw chuck.

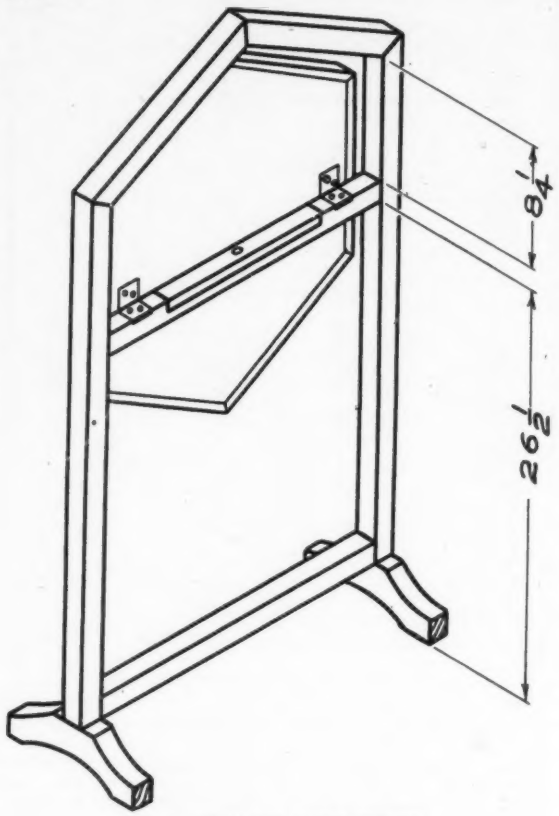


FIG. 2. TRAY TOP TABLE FOLDED.

Work on the clamp bar is started next. The stock may be turned on centers but it will be found more convenient to chuck a bar and support the small end with the tail center while turning the small diameter. The ball is finished with a forged forming tool. While this bar is still in the chuck, the ball which is to be riveted to the small end of the clamp bar should be finished.

The wheel-spindle collar and clamp-screw cap need no description other than the method of cutting the bevel. This may be accomplished either by swinging the compound rest, or by means of a forming or facing tool.

The proper uses of reamers and the grinding of drills for cutting brass may be taught during the making of the bushings. Considerable saving of time, material, and temper will be effected if the bushing stock is sawed to length rather than attempting to make them direct from the bar. This is done in order that the drill and reamer may be run entirely through the stock. The bushings should not be finish-turned to size until after the case has been bored.

The student should be introduced to the uses of mandrels during the work of making the final drive pinion and the two intermediate pinions. These must be very accurately made, the hole must be carefully reamed, the small diameter must be a press fit in the large gear, and while a few thousandths variation may be tolerated on the outside diameter of the pinion proper, it must be allowed for in the set-up for milling the teeth. In case any of these pinions are spoiled in the turning or cutting of the teeth they may be turned down later into bushings for the spindle.

In the machining of the large gear blanks the only remarks which seem necessary are in regard to the blank which screws on the drive shaft. This blank should be counterbored so that it will fit snugly against the shoulder of the drive shaft. The finish-turning and cutting of the teeth will be done using the drive shaft as an arbor.

The nut for the spindle may involve as much or as little work as the individual instructors think advisable. We use a left-hand tap to cut the thread because of the difficulty of keeping small internal threading tools in a usable condition.

After the student has progressed to this point, he needs but little instruction to finish the crank handle, handle screw, and tool-rest parts.

(To be continued next month.)

A TRAY-TOP TABLE

Margaret Fullerton

The shops of today feature an endless variety of extra tables, but the limited space of most homes makes it necessary to choose only one or two. These must be the models which are most conservative of space and most versatile in use.

Such a table is this tray-top table which is easily folded up when not in use, and which may be used as a tray, a tea cart, or a side table to hold extra dishes, magazines, or sewing. As a tray it does not require extra space on a cabinet or buffet, and thus is especially desirable where space is at a premium. As a tea cart it may be easily carried or wheeled about just like the more elaborate service wagon.

Figure A gives both stencil and inlay designs for decorating the tray-top table. The unit given is to be applied in each of the six corners.

If the stencil pattern is to be used, the table should first be enameled in buff, grey, ivory, or some other color which will best harmonize with the furnishings of the home. With a buff background the design would look well in blue and brown. A grey background would look well with rose and green. Tints of any hue will harmonize with buff.

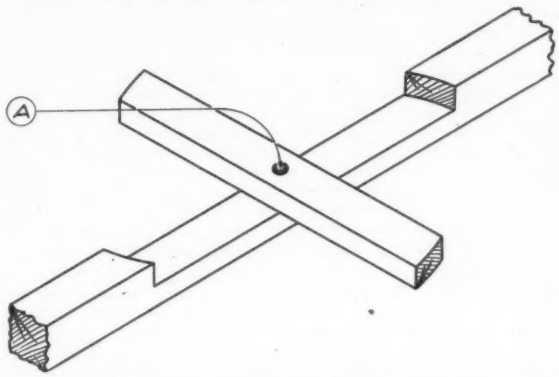


FIG. 3. DETAIL OF TABLE SUPPORT SHOWING HINGE PIN AT *A*, MARGARET FULLERTON.

If the top is to be inlaid, six triangles are cut and fitted together, the grain of the wood running in the directions indicated by the crosshatching. Thus, an interesting pattern of concentric hexagons is made by the direction of the grain. The unit given at A, Figure 4, is inlaid in each corner with the border connecting them. A satisfactory combination of woods will be found in using Jenezero for the background, rosewood for the border and the background of the unit, bois d'arc for the lightest part of the unit, and vermilion for the darkest part.

The supporting frame is made up of pieces 1½ by 1½ in. The legs are fastened to the feet by mortise-and-tenon joints, the same type of fastenings joining the legs and horizontal cross members. The slanting top members of the frame are fastened to each other and to the vertical legs by means of blind, mitered, dovetail joints.

The edge of the tray is finished with a molding to prevent dishes from slipping. The legs may be fitted with small rollers if one prefers to roll the table rather than carry it.

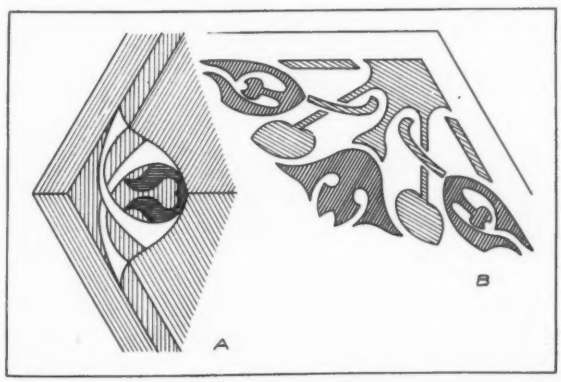


FIG. 4. AT *A* IS SHOWN AN INLAY DESIGN FOR THE TRAY TOP TABLE AND AT *B* A STENCIL DESIGN, MARGARET FULLERTON.

A GEAR PULLER

George F. Johnson, Vocational and Technical High School, Grand Rapids, Michigan

This device consists of a central screw, a body through which the screw is threaded, and a pair of jaws or hooks to grip the sides of the gear which is to be removed. It is chiefly useful in removing the timing gears from Ford crankshafts and other small gears of a similar sort.

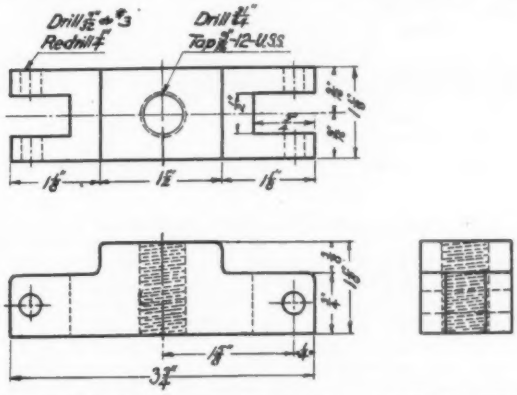
The Body

The material for this part of the gear puller is 1¼-in. square mild steel furnished ⅛ in. longer than the finished member in order to allow for a milling operation on all six surfaces of the piece.

The first series of operations are those in which we reduce the 1¼-in. square to a 1⅛-in. square. This is done in the milling machine with a plain mill of small diameter.

Mount the work in the milling-machine vise on a parallel strip of such size as to permit about ¼ in. of the work to project above the vise jaws. Set the machine so that $\frac{1}{16}$ in. of metal will be removed in one cut along the full length of the upper side. Use cutting oil. Then remove the burrs from the edges of the work and clean the vise carefully. Again clamp the work securely in the vise so that the finished side shall be against the solid jaw of the vise and take a cut the full length of the exposed surface with the same setting used for the first cut. Next, clean the vise, remove the burrs from the piece, and again mount the work in the vise so that the surface that was finished first shall be against the solid jaw and the surface that was finished with the second cut, shall be on the parallel strip. Then feed the knee up $\frac{1}{16}$ in. farther than you had it for the first two cuts and take this third cut along the exposed surface. Finally, clean the vise, remove the burrs from the piece, and take the fourth cut at this same setting. Use cutting oil for all these cuts.

Now remove the plain mill from the arbor and replace it with a ⅞ by 4-in. side mill. Then swivel the vise 90 deg. from its former



GEAR PULLER BODY, DESIGNED BY G. F. JOHNSON, GRAND RAPIDS, MICH.

position and clamp it tightly in place. Remove all burrs from the work, and mount it securely in the vise on the same parallel strip used before so that the work extends about ¼ in. beyond the ends of the vise jaws toward the column of the machine. Then raise the knee so that the circumference of the cutter goes $\frac{1}{16}$ in. below the bottom edge of the work. Clamp the knee to the column. Next, feed over the cross slide by hand until the side-cutting teeth of the cutter just touch the work, and, withdrawing the work from the cutter by feeding the table along (not the cross slide), feed in the cross slide so as to remove $\frac{1}{16}$ in. from the end of the piece. Be sure to use cutting oil. Repeat the operation on the other end of the piece and reduce it to the length called for in the drawing, that is 3¾ in.

Again mount the plain mill of small diameter and mill the steps or shoulders shown in the drawing which are ⅜ in. deep by 1⅛ in. long. Have the work mounted on a parallel strip that shall permit the work to project above the jaws of the vise not less than $\frac{1}{16}$ in. nor more than ½ in. Mill one shoulder or step; then turn the piece end for end in the vise and mill the other step in the same manner. It will be well to mark the two upper edges of the piece before mounting it, so that you may know where to set the cross slide in order to make the steps exactly 1⅛ in. long.

The final milling operation is to cut the two ½ by ¾-in. slots; one in each end of the piece. To do this, mount a ½-in. plain mill of suitable diameter on the arbor. Then mount the work endwise in the vise with the straight side up against a ⅜ by 2⅛-in. parallel strip set up edgewise against the solid jaw of the vise. It will be well also to put a "filler block" of suitable size in the vise, say ⅜ by 1 by 2 in., between the work and the movable jaw in order to help hold the piece against the heavy thrust of this cut. Then proceed to cut the slot in one pass. Repeat the operation on the other end. It will be well here also to have the ends laid out before mounting so that you may have the slots exactly in the middle of the ends as shown in the drawing. This completes the milling operations.

Next, lay out and drill the small holes at the two ends with a $\frac{7}{32}$-in. drill and then redrill with a ¼-in. drill. Then lay out and drill the $\frac{31}{64}$-in. hole through the center of the piece and tap a $\frac{3}{16}$-in. 12 U. S. S. thread clear through. Use cutting oil on all these operations. Wind a piece of waste around the tap and retap.

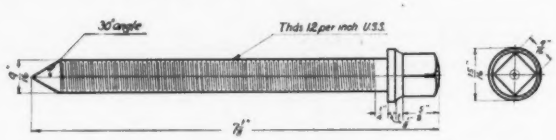
Finally, remove all sharp edges, and file and polish all over, and stamp your name across one face.

The Screw

The material furnished for the screw is 1-in. round mild steel cut ⅜ in. longer than the finished article, in order to permit the removal of the center hole at the point end when completing the screw. Note that the other center hole is shown remaining in the finished screw.

Center the piece as usual in both ends by drilling ¼ in. deep with a ⅛-in. twist drill, and then finishing the center with a 60-deg. countersink so that the opening at the top shall be not more than ¼ in. across. NOTE: This same operation may be done with a combination drill and countersink which drills and countersinks the piece at the same time. The locating of the centers in both ends is done by means of a centering head and a scriber.

Mount the piece in the lathe between centers and machine it to a diameter of $\frac{1}{16}$ in. for about 2 or 3 in. Then machine this same end to the diameter that the diagonal of a $\frac{3}{16}$-in. square would measure. A method of finding that measurement when the side of the square is given is: The side of the square times the square root of 2 equals the length of the diagonal. (.562 in. × √2 = the length of the diagonal.) It is suggested that you find the square root of 2 to three decimal places and use the decimal equivalent of the side of the square to the same number of places.



GEAR PULLER SCREW, DESIGNED BY G. F. JOHNSON, GRAND RAPIDS, MICH.

When you have found this diameter, machine the piece to that size for a distance of ¾ in. as shown in the drawing. Note that the drawing indicates this length ends in a curved shoulder.

Turn the piece end for end in the lathe and machine the other end of the piece to a diameter of $\frac{5}{16}$ in. up to a distance of ⅞ in. from the head end.

The threading operation comes next. First grind a tool bit to the exact shape of the thread to be cut. This is the more easily done by fitting the tool bit to a center gauge. CAUTION: Be sure to have a clearance on the sides of the V-shaped tool bit and that the point of the V is in the center of the tool bit; otherwise you may not be able to cut the thread as far as the drawing calls for.

When the tool bit is ground properly, mount it in the tool holder, and the tool holder in the tool post of the lathe so that the point of the tool bit shall be at the same height as the point of center, and so that the back edge of the center gauge shall be parallel to the piece to be threaded when the large V on the other edge of the gauge is fitted over the tool-bit point. INFORMATION: For threading operations many consider it an advantage to have the compound rest set to 30 deg. to the right of perpendicular and, instead of feeding the tool bit straight into the threads with the cross slide, they bring the cross-slide dial to the same point for each cut and advance the cut with the slide of the compound rest. This permits one to have a decided rake on the left cutting edge of the threading tool if desired, and it is often desirable especially when cutting threads of coarse pitch. For this reason many good mechanics leave the compound rest normally in the 30-deg. position and move it only when it is specially needed in some other given position. CAUTION: The tool post should be at the extreme left of the tool-post slide and the tool holder extended far enough so that the dog will not strike on the compound rest and thus prevent the thread to be cut as far as the drawing calls for. When everything is set, run the carriage up by hand to see that everything is actually clear.

Run the machine at next to the highest speed possible *with the back gears in.* See that the machine is geared for cutting 12 threads per inch. Drop the half nuts into position, and take a trial cut. Count the resulting number of threads per inch. CAUTION: When the tool reaches the end of its cut, it must be withdrawn from the thread while in motion, and the lathe reversed until the tool is returned to the starting position. DO NOT RELEASE THE HALF NUTS. If the number of threads per inch is correct, continue cutting the threads with a series of *light cuts* until the entire length of the screw fits nicely in the threaded hole in the body of the gear puller. CAUTION: In removing the screw from the lathe to try in the body, do not remove the dog from the piece and be sure to remount the piece in the lathe so that the tail of the dog will be returned to the same slot in the driving plate; otherwise the thread will be crossed and spoiled in the next cut.

When the threading is complete, disengage the half nuts. Remove the driving plate and the center (and sleeve, if any) and mount the chuck on the spindle. Place the head end of the screw in the chuck so that only about 1 in. of the pointed end extends beyond its jaws and true it up carefully. Then set the compound rest 30 deg. to the right of horizontal, and, mounting a proper cutting tool at right angles to this angle, take a series of cuts to reduce the point of the screw to the shape shown in the drawing. Then turn the screw end for end in the chuck, true it up again, and machine the end of the head to the slightly curved shape shown in the blue print. Lightly file and polish both ends to a finish in the speed lathe.

The screw is now complete so far as lathe operations are concerned. The next step is to machine the square-head end in the milling machine. To do this, mount the index head on the milling-machine table in either the horizontal or vertical position and on the spindle of the index head mount the milling-machine chuck tight up against the shoulder. Tap it with a lead mallet to make sure it is tight. Then mount the shank of the screw securely in this chuck with the nose of the chuck jaws close up behind the shoulder of the head of the screw. Make sure the little pin on the end of the index handle is dropped into some hole in the index plate and that the beveled edge of a sector arm is close up against the pin.

Now mount a suitable cutter (it can be either a side mill or an end mill) so that the cutting edges shall be rotating in a direction away from the work and toward the front of the machine. Set a stop on the machine so that your cut will go back the proper distance, but no farther, and proceed to take off in one cut one half of the amount needed. CAUTION: Take the cut in such a manner that the thrust of the cutting action will tend to tighten the chuck on the spindle rather than loosen it.

After taking this half-depth cut on one side of the head of the screw, withdraw the work from the cutter and rotate the index handle ten (10) complete turns and drop the pin on the end of the index handle back again into the same hole in the index plate from which you started. The sector arm is used for locating readily the same hole in the index plate. Then take the cut again and repeat on the remaining two sides.

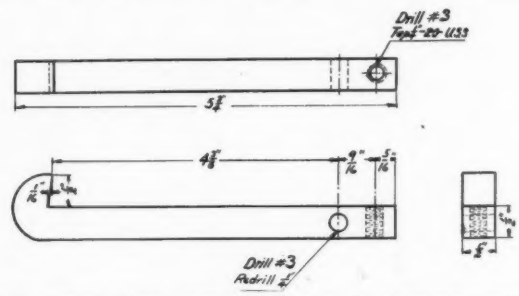
Finally, feed the table over so that the cutter will take off the remaining half of the material, down to the required size of the $\frac{3}{16}$-in. square. Remove the work from the chuck, clean the machine, and then stamp your initials on the flats of the square just machined.

The Jaws or Hooks

The material furnished for these two parts is ½ in. square mild steel with the one end forged roughly to the required shape.

The first operation is to straighten any bends the piece may have acquired in the process of forging. This is done on a bench plate with a few blows of a hammer. Be careful not to nick the work with the edge of the hammer and thus make a lot of extra filing necessary.

Then, with a three-cornered file, finish the angles of the two hooks so that the upper edges will tilt $\frac{1}{16}$ in. to the right as is clearly



GEAR PULLER JAWS, DESIGNED BY G. F. JOHNSON, GRAND RAPIDS, MICH.

shown in the drawing. Then file the rest of the inside surfaces to a finish, cut off the ends of the hooks with a hand hacksaw to the required length, and grind to the curved shape as indicated in the drawing.

Next, cut off the ends opposite to the hook, to the proper length with a hand hacksaw and grind or file to a finish. Then drawfile the backs of the hooks to a finish.

On the sides of the hooks where the bends are, there are uneven places called "buckles" which are due to the bending operation. *Leave them. Do not grind them off.* They add strength where it is needed. But drawfile both sides of the hooks up to the buckles. CAUTION: In all this grinding and filing, be careful to remove only so much metal as is necessary. The more you remove, the weaker the hooks are.

Now locate and center punch deeply the centers of the holes to be drilled. Note that one hole goes through one side and the other hole through the side at right angles to the first. Also note the relation of these holes to the position of the hook end. It will be well to drill all four places first with a No. 3 drill, and then redrill the two holes with the ¼-in. drill after you have tapped the two end holes with the ¼-in. 20 U. S. S. tap. In drilling, be careful to have the piece lying flat and use a clamp to avoid accident if the drill should catch. Use cutting oil. In tapping, use cutting oil and be careful to start the tap straight. This last is a hand operation at the bench vise.

Finally, remove all burrs and sharp edges, and stamp your name along one side of each jaw.

Assembly

When all the above operations are completed, hand the separate pieces to the instructor for inspection and for casehardening. Then, when the parts are returned to you and you have cleaned and oiled them, the instructor will supply you with the two ¼-in. pins each 1¼ in. long, which may be driven lightly through the holes in the end of the body and the holes in the jaws or hooks that match. Oil the pins with machine oil before driving them in.

Do not rivet these pins. They will stay in without that.

Oil the ⅜-in. screw with machine oil and run it through the body of the gear puller with a wrench in order to remove any scale left from the casehardening operations.

CAUTION: Do not try to file, drill, tap, run a die over, or stamp your name on any of these parts after they have been casehardened. You may polish them if you wish, but the mottled purple, brown, and black finish which has been put on the pieces by the casehardening process is as highly prized among metal workers as any of the latest wood finishes are among woodworkers.

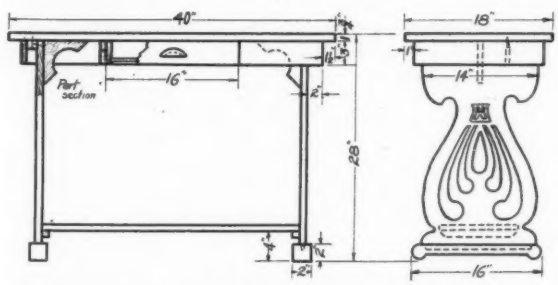
The two ¼-in. 20 U. S. S. tapped holes were made in the hooks to receive a square-head setscrew 1¼ in. long. The setscrews should be casehardened. They may be purchased at any hardware store for a few cents. The gear puller will work without them, but in difficult cases they prevent the jaws slipping off the sides of the gear being pulled.

"The ideal workman is that man who likes his work and who gives a maximum product of quality and usefulness with a minimum of time and material."

A SMALL TABLE

W. W. White, Huntington, Indiana

The table shown in the accompanying illustrations is made of walnut, finished with oil shellac and two coats of varnish rubbed to a dull eggshell effect.



TABLE, DESIGNED BY W. W. WHITE, HUNTINGTON, IND.

The 3-in. rail is mitered at the corners. Blocks screwed and glued into place, reinforce the corners. The rail is fastened to the top with screws which are sunk into it. The ends, or uprights, are fastened to the top with strips and screws. They are mortised into the foot pieces. The drawer is supported by slides which are fastened to the front and back rails. The design for the carving may be made

TABLE, DESIGNED BY W. W. WHITE, HUNTINGTON, IND.

as shown in the drawing or changed to suit the taste of the maker. It is best to cut the template of stiff paper to transfer the design to the wood.

A AND B BATTERY CHARGER

E. A. Rerucha, Wakefield, Michigan

In designing a transformer for the charger, the natural objective is to make it as efficient as possible, that is, to keep the losses as low as possible.

The design of the transformer of this battery charger is based upon experimentation and the theory of design of small transformers. Frequently the objection to "homemade" battery chargers is that the cost is approximately the same as that of those on the market while

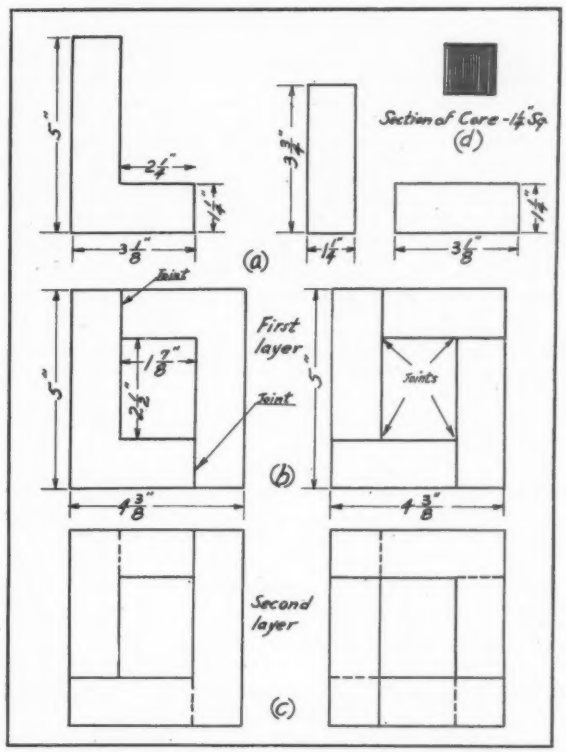


FIG 1. L TYPE AND RECTANGULAR PIECE CORE CONSTRUCTION FOR A AND B BATTERY CHARGER, DESIGNED BY E. A. RERUCHA, WAKEFIELD, MICH.

the performance of the device does not measure up to that of the commercial make. The charger herein described draws about 60 watts when charging a 6-volt A battery and 50 watts when charging a B battery of two 48-volt groups in parallel, at a charging rate of 1/10 ampere. The no-load losses of the transformer are sufficiently low to be disregarded as a disadvantage. They measure about 40 watts or .04 kw., and considering that the construction is such that it is possible

to make the transformer in the average electrical school shop, these operating losses compare favorably with those of the commercial types.

Transformer Theory

The inductance of the primary winding keeps the primary current from becoming excessive, or constituting a short circuit when the transformer is connected to the line. The iron core increases the inductance of the winding so as to make it practicable. If there is an insufficient volume of iron in the core of a transformer for a given size, the current will cause excessive heating. For this reason it is important that a transformer should have the proper amount of iron in the core so as to keep the heat losses and the losses due to the resistance of the wire at a minimum, as the resistance of copper wire increases with an increase of temperature.

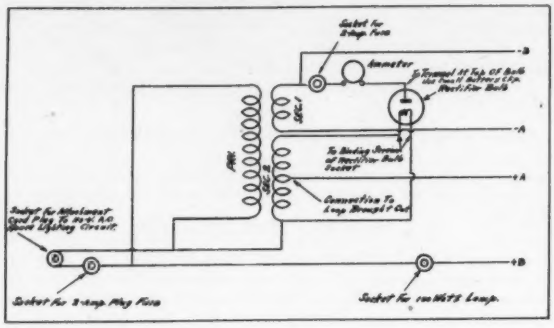


FIG. 2. WINDING DIAGRAM OF A AND B BATTERY CHARGER.

A core-type transformer was selected to provide better cooling facilities for the winding and also because of the simplicity of construction.

The Transformer Core

The core of the transformer is constructed from silicon-steel laminations obtained from an old lighting transformer. Power and light companies usually junk old transformers of the smaller sizes and these can be obtained for a small amount and the laminations used. The laminations from the core of one of these transformers will be more than sufficient for building the core of this transformer. Remove the laminations, being careful not to damage the insulation as this insulates the laminations from each other and tends to keep the eddy-current losses down. Clean the laminations thoroughly with kerosene or gasoline. Figure 1 shows the dimensions and how the core is constructed. Care should be taken to fit the pieces closely where the joints are made so as to form a complete metallic circuit of each layer of laminations. The core may be constructed from L-shaped pieces or straight strips as shown at *a*, Figure 1, although construction from L-shaped pieces is preferable as it reduces the possibilities of air gaps at the joints because there are only half as many joints. The dimensions of the opening and the volume of iron used are the same for either type of construction. The joints are alternated as shown at *b* and *c*, Figure 1.

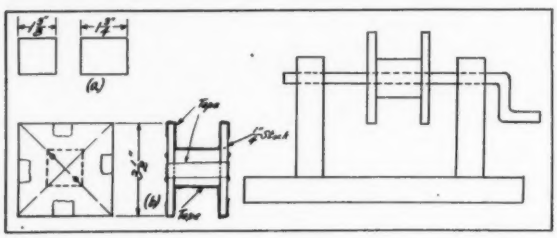


FIG. 3. COIL FORMS.

FIG. 4. COIL WINDER.
A AND B BATTERY CHARGER, DESIGNED BY E. A. RERUCHA, WAKEFIELD, MICH.

A sufficient number of pieces should be cut to make a core 1¼-in. square as shown by the section of the core at *d*, Figure 1. The laminations should be clamped together tightly to determine if a sufficient number has been cut.

The Coils

The windings of the transformer are indicated as Pri., Section 1, and Section 2, in Figure 2. The primary is wound on a separate spool, while the two secondaries, 1 and 2, are wound on the same spool. The primary is connected to the 110-volt a.-c. house-lighting circuit. The winding marked Section 1 applies to the charging current which is rectified to direct current and the Section 2 supplies the filament-heating current for the rectifier bulb.

FIG. 5. A AND B BATTERY CHARGER, DESIGNED BY E. A. RERUCHA, WAKEFIELD, MICH.

The primary winding consists of 580 turns of No. 20 D. C. C. magnet wire. The Section 1 consists of 155 turns of No. 15 D. C. C. magnet wire. Section 2 consists of 10 parallel turns of No. 10 D. C. C. magnet wire with a tap brought out at the fifth turn.

The easiest way to wind the coils is to make a form. Cut a rectangular block of wood (Fig. 3), whose cross-section dimensions are ⅛ in. more than those of the iron core, and whose length is ⅛ in. less than the width of the window as shown in Figure 1. (See *a*, Fig. 3.) Also cut two pieces about 3½ by 3½ in. from ¼-in. stock for heads to hold the winding as it is being wound. (See *b*, Fig. 3.) Drill two small holes in the headpieces for screws to fasten them to the end of the core block as shown at *b* in Figure 3. Locate the centers of the spool and mount in a lathe for winding. If a lathe is not available, some other form of winder can be improvised, as for example in Figure 4.

Winding the Coils

Cut 4 pieces of friction tape about 6 in. long and stick 1 piece in the center of each side (longitudinally) of the spool core, drawing the ends over the spool heads and sticking them on the outside of the spool heads. (See *b*, Fig. 3.) Next wind several layers of heavy wrapping paper on the spool (over the tape), applying a thin layer of glue on the paper as it is wound so that a rigid core is provided for the coil when completed. Now wind on evenly, 580 turns of No. 20 D. C. C. magnet wire for the primary, leaving about a foot of the wire on each end of the winding for making connections. Remove the ends of the 4 pieces of tape and bring them over the winding and stick the ends of each piece together so as to bind the winding. Take the form off the lathe and remove the head on one end and slide the coil from the core. Now tape the coil with a layer of friction tape or armature tape by winding the tape over the inside of the paper core and outside of coil in the manner of the 4 short pieces of tape so that the coil and paper core are firmly bound together.

The Section 1 is wound in the same manner as the primary, with 155 turns of No. 15 D. C. C. magnet wire. Do not remove the 4 pieces of tape stuck to the heads of the form as in the case of the primary, but wrap a layer of friction tape over the winding after

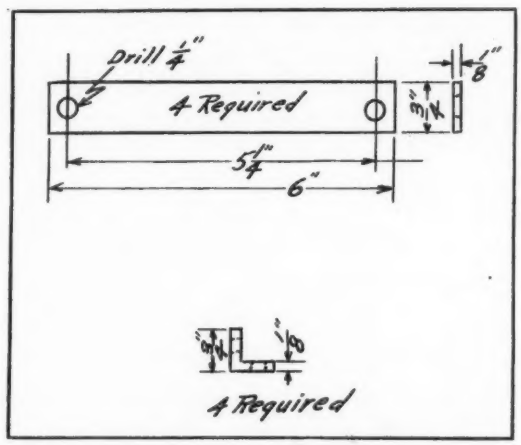


FIG. 6. CLAMPING STRIPS AND MOUNTING SUPPORTS FOR A AND B BATTERY CHARGER.

155 turns have been wound. The Section 2 is then wound on top of the layer of tape. This consists of 10 parallel turns of No. 14 D. C. C. magnet wire. Double the No. 14 wire and wind 10 turns of the doubled wire, bringing out a tap from the fifth turn. This tap should be about 6 in. long. Leave about 12 in. of wire at the ends for making connections. Now bring the ends of the 4 pieces of tape over the coil and then remove the coil from the form and tape the coil as you did the primary.

Assembling Core and Coils

Figure 5 shows how the coils appear in the assembly. When assembling the core, the laminations are placed into position from alternate sides so as to stagger the air gaps between the joints as is illustrated in Figure 1, *b* and *c*. Be careful not to damage the insulation of the windings. When almost all the laminations are in place, the core may be placed in a vise and several more pieces squeezed partly in. Then remove the core from the vise and hammer the pieces into position. The core is now clamped together with iron strips and the mounting supports attached. (See Fig. 6.) Four iron straps ⅛ by ¾ by 6 in. and 4 supports, which may be cut from ¾-in. angle iron are required for clamping the core and mounting it. Bore a hole in the center of each face of the supports and also in the ends of the iron straps as shown in Figure 6.

The transformer may be given a coat of black paint or enamel to improve its appearance. The winding may be given a coat of shellac.

Assembling the Charger

The arrangement of the various parts can be left to the maker's choice and his ingenuity can be drawn upon to make a compact and neat-appearing assembly. However, do not place the rectifier bulb too close to the transformer windings because of heating. The complete wiring diagram and data are given in Figure 2.

The 110-volt lighting circuit is connected to the charger by means of an attachment cord and plug. The socket for the fuse plug is connected to one side of the line and the primary of the transformer across the line as shown. Then one side of the 110-volt line connects to the socket for the 100-watt lamp. The other side of the socket connects to the plus B binding post. The other side of the 110-volt line connects to one side of Section 2, this same side of Section 2 being connected to the socket for the rectifier bulb. The other side of Section 2 connects to the remaining side of the rectifier-bulb socket. The middle tap of Section 2 connects to binding post plus A. Then one side of Section 1 connects to minus A. The other side connects to the plate terminal of the rectifier tube (at top of tube) by means of a battery clip attached to the end of the wire. A tap is also taken from this side of Section 1 and connects to binding post minus B. A Ford ammeter may be used and connected as shown. If an ammeter is not desired, the connection from Section 1 is made directly to the plate terminal of the rectifier bulb. The ammeter is not necessary and will indicate only when charging an A battery as the small current required for B-battery charging will not cause the ammeter to indicate, unless a more sensitive instrument is employed.

When the wiring is completed it should be checked carefully against the diagram. Then connect the charger to the light circuit, and measure the voltage across the two A and the two B binding posts. It should be about 10 volts across the A and about 50 volts across the B binding posts. If the above readings are not obtained, reverse the Section 1 connections. That is, the end of Section 1 which was originally connected to binding post minus A will now go to the plate terminal of the rectifier bulb and to minus B and to the ammeter if one is used. The end that was originally connected to the ammeter and minus B will then go to minus A. If the ammeter indicates backward when charging, reverse its connections. The rectifier bulb is rated for 2 amperes and should not be forced to charge at a higher rate.

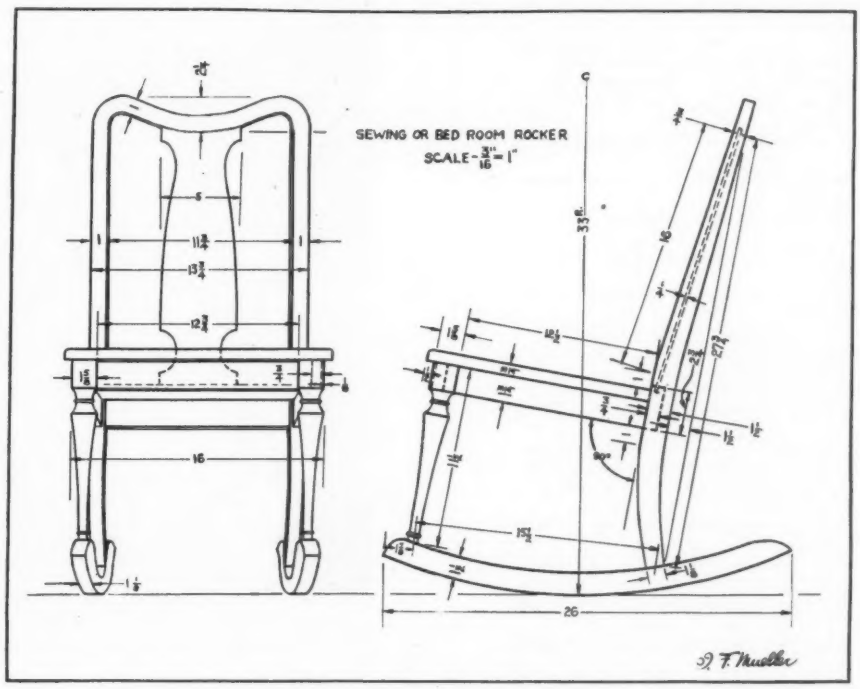
Bill of Material

1 2-ampere Tungar or Rectigon rectifying bulb.
2 Attachment cord socket plugs.
5 Light sockets.
1 Ford ammeter. (Optional.)
1 Panel, 6 by 6 by ¼ in.
1 100-watt lamp.
2 Universal battery clips.
4 Binding posts marked +A, —B, +B, and —B.
1 Mounting base, 12 by 6 by 1 in.
1 Small battery clip. (For plate terminal of bulb.)
2 2-ampere plug fuses.
1 pc. Lamp cord, 6 ft. long.
1 pc. Rubber-covered No. 14 or 16 flexible cord for battery connections, 4 ft. long.
1 lb. No. 20 D.C.C. magnet wire.
1¼ lb. No. 15 D.C.C. magnet wire.
½ lb. No. 14 D.C.C. magnet wire.
Silicon-steel laminations.
1 pc. Strap iron, ⅛ by ¾ by 24 in.
1 pc. Angle iron ¾ by ⅛ by 3 in.
4 ¼ by 2 in. bolts.

SEWING OR BEDROOM ROCKER

I. F. Mueller, Thomas Jefferson High School, Council Bluffs, Iowa

This sewing rocker was designed so as to be low, dainty, well balanced, and comfortable. It is intended that the seat be caned. It works up particularly well in walnut and should make an excellent problem for a boy in the fourth semester of woodwork. The design of the front legs is only indicative, and the leg may be turned or designed to suit. Side rails are well mortised, ⅛ in. in from surface of the legs. A small margin on legs always looks better than a



SEWING OR BEDROOM ROCKER, DESIGNED BY I. F. MUELLER, COUNCIL BLUFFS, IOWA.

large one, and the task of laying out the job that way is no harder. The chair can be well braced by means of wooden corner braces, 2 in. thick, permitting a large gluing surface. Bottoms of legs are not to be cut to right length until rocker is made, which is then laid on and legs are marked alongside. Tenon legs well into rocker for strength. The toppiece is doweled into the ends of the legs. Leave the outside corners of the toppiece square until glued on, thus leaving a square space for the application of clamps. After the glue is dry, cut the toppiece round as shown in the illustration.

FIRST YEAR MECHANICAL DRAWING TRUE-FALSE TEST

August Flam, Los Angeles, Calif.

This article is the first of a series of four tests for mechanical-drawing students. The tests are arranged as follows:

Test	*No. of Exercises*	*Type*
1. First-year mechanical drawing.....	50	True-False
2. First-year mechanical drawing.....	15	Multiple
3. Principles of dimensioning.....	20	True-False
4. Second-year mechanical drawing.....	12	Completion

Test No. 1

Indicate a true statement by a capital T, or a false statement by a lower-case letter f placed in the parenthesis at the end of each statement.

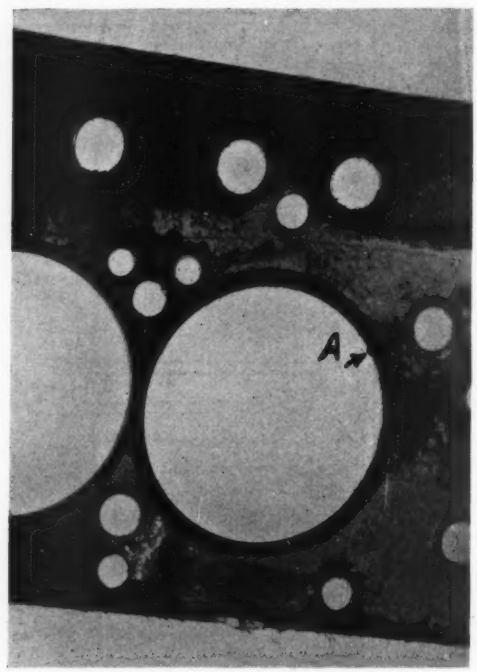
1. Lettering is of no particular importance in mechanical drawing. ( )
2. Guide lines should never be drawn for the tops and bottoms of each line of lettering. ( )
3. The shapes of the figures are just as different from those used in ordinary figuring as the letters are from ordinary writing. ( )
4. A 4H pencil is harder than a 2H pencil. ( )
5. Of the two pencils the 4H is used for lettering and the 2H for drawing lines. ( )
6. In orthographic projection, objects are represented by a single view. ( )
7. Since it is necessary to describe every part of an object all surfaces must be represented whether they can actually be seen or not. ( )
8. Horizontal lines may be drawn with either the top or bottom edge of the T square. ( )
9. The top view of an object never gives the height. ( )
10. Surfaces which exist but which are invisible are represented by long and short dashes alternating. ( )
11. Where the interior of an object is not very complicated a section should be taken. ( )
12. A full section is the view obtained when the cutting plane extends clear through the object. ( )
13. When two pieces are shown in section together, they are cross sectioned by lines running in the same direction. ( )
14. Such parts as bolts, nuts, screws, and shafts are not usually sectioned. ( )
15. Different materials are never indicated by varying the kinds of section lines and the spacing between them. ( )
16. Crosshatching is entirely different from section lining. ( )
17. Both the exterior and the interior of an object may be on one view by means of a half section. ( )
18. Slanting surfaces are not necessarily foreshortened in the usual end view. ( )
19. It is rarely necessary or desirable to show a slanting surface in its true shape. ( )
20. The auxiliary view shows the slanting surface in its true shape and size. ( )
21. The two essential things to be told about any object are its shape and size. ( )
22. If a circle is parallel to a plane its projection on that plane is a straight line. ( )
23. The dimension line is made up of long-dash lines. ( )
24. The same dimension is not repeated on different views unless there is a special reason for it. ( )
25. Dimensions should never be given from center lines. ( )
26. A line of the drawing should never be used as a dimension lines. ( )
27. The drawing of a separate part is called a detail drawing. ( )
28. An angle is the distance inclosed by two nonparallel lines. ( )
29. A tangent is a line touching a circle or a part of a circle at one or more points. ( )
30. Two lines are said to be parallel if they do not meet when produced indefinitely. ( )
31. A horizontal and a vertical line intersect at right angles. ( )
32. A degree is a 360th part of a minute. ( )
33. The form of screw threads generally used in this country for machine bolts is the sharp "V" thread. ( )
34. A helix is of considerable importance in the drawing of bolts and nuts. ( )
35. The pitch of a screw is usually the same as its diameter. ( )
36. A small threaded hole is called a tap. ( )
37. In order to draw the head of a hexagon bolt a regular hexagon must first be constructed. ( )
38. The area of a hexagon 2 in. across flats is greater than that of a hexagon 2 in. across corners. ( )
39. The distance across flats or the distance across corners may be used in drawing a hexagon. ( )
40. In developing (stretching out) a cylinder a rectangle results. ( )
41. The development (stretchout) of a cylinder may be made more accurate by using a large number of divisions on the circumference. ( )
42. In isometric projection, measurements may be taken on any horizontal or vertical line. ( )
43. Nonisometric lines are lines not parallel to the isometric axes. ( )
44. An assembly drawing should carry all the dimensions for making all the parts. ( )
45. In inking a pencil drawing all the lines should be of the same grade of thickness. ( )
46. All straight lines are inked with the ruling pen. ( )
47. To fill the ruling pen dip it lightly into the ink bottle. ( )
48. Circles should always be inked with one stroke, inclining the compass in the direction of the line. ( )
49. In inking it is much easier to connect a straight line to a curve than a curve to a straight line. ( )
50. It is a rule in inking that circles and circular arcs must be drawn first. ( )

Test No. 2 will appear in an early issue of the INDUSTRIAL-ARTS MAGAZINE.

"THE ENGINE WON'T TURN OVER; THE STARTER JUST GRUNTS AND QUITS"

Ray F. Kuns, Cincinnati, Ohio

"Has it been turning over properly?" is asked and usually the assurance is given that it has up until just recently. "It has been working fine but now it just bucks." It may be that the speaker will even admit that after a time the engine gets started and that a lot of water is then blown out of the muffler. Or he may say that he tried to turn the engine over by hand and found that he could not budge it. The suggestion of the possibility of having water in the cylinders is usually frowned upon, for the speaker will usually say that he just had it overhauled, or he will say that the engine was not touched for months. However, the indications are that there is water in the cylinders. It may get past the gasket, due to failure of the gasket after a long period of service, or it may be getting past due to an injury to the gasket. In one case, at least, it got in by following a small core wire which dropped out of the cylinder head and lodged as shown at A in the accompanying illustration. If the leak is there for any reason, and the engine is just



A LITTLE WATER LEAK AT *A* CAUSED LOTS OF TROUBLE.

starting up on compression for the cylinder in which the leak has developed, it will fill the cylinder and then, when an attempt is made to crank the motor, it refuses to turn over because water is not compressible as are air and other gases. Furthermore, this water must be removed before the engine may be turned over. If the hand crank is used and the piston brought up and held, the water may be forced out past a leaky valve or through the place where it came in. Or the car can be put in high and rolled backward to open a valve and allow the water to get out that way. When the water is once out, the car can be cranked and driven to a place where it can be remedied with a new gasket.

AN INSTRUCTION SHEET FOR THE SHEET-METAL SHOP

George A. Todd, Waukegan, Illinois

A Sheet-Metal Hanging Vase

Materials: Sal ammoniac, solder, flux, IC or IX tin, lacquer, transfers, and oak, walnut, or mahogany for the back.

Tools: This, being an advanced problem, presupposes that the student has covered all the processes in previous problems that are required in this one. Therefore, he should be required to select the tools necessary in the construction of this problem.

Procedure:

The Making of the Back:

a) Square the stock for the back to dimensions.
b) Lay out the design on drawing paper. It is suggested that the student be original in the design. Refrain from copying as far as possible.
c) Transfer this design to the wood.
d) By means of the proper woodworking tools cut it to the line.
e) Sandpaper very carefully. Keep all edges square and sharp.
f) Lacquer, or stain and fill. Be sure that the colors harmonize, and also keep them in harmony with the room in which the vase is to be placed.

The Making of the Bracket Hanger:

a) Cut strips of copper or brass to size.
b) Place the strip on an iron surface and by means of a small ball-peen hammer pound the surface very carefully and evenly.
c) Locate distances by referring to the blue print. Bend or form. Make the bends square if intended to be so.
d) All holes for screws should be located with a prick punch, then drilled.
e) Determine the length of wire to use for the hanger. This should be formed around ¼-in. round iron. It can then be pulled tight by placing the free ends in an iron vise and tightening the jaws together. In this way you can obtain a perfect circle. The part above the circle is some-

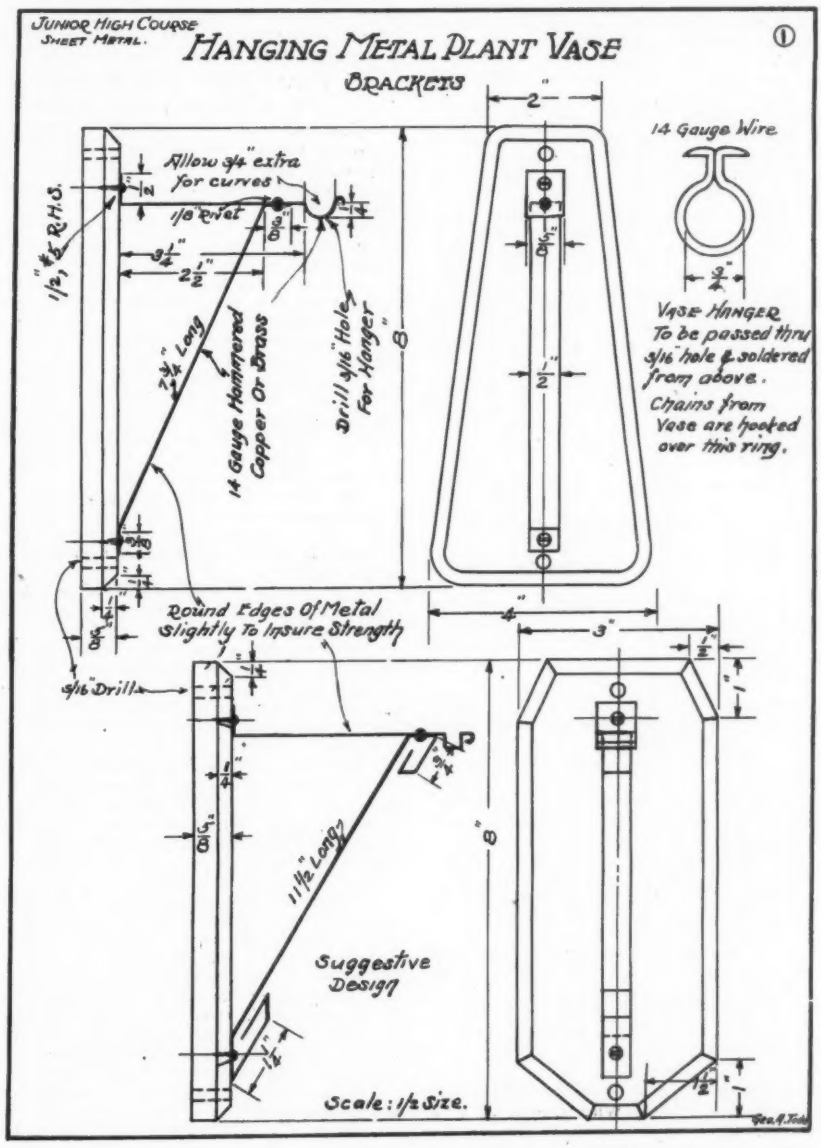


FIG. 1. SUGGESTIVE DESIGNS FOR BACKS AND BRACKETS FOR HANGING METAL PLANT VASES.

what flattened as you will see by referring to the blue print. The curved shape on the ends must be made before putting through the arms.

f) Clean the surface of the metal by dipping it in a weakened solution of nitric acid.

g) Rivet the brace and arm. Observe carefully the rules for riveting.

h) Put the ends of the ring through the hole in the hanger, bend into position. Solder.

i) To keep the surfaces from oxidizing paint them with banana oil, or colorless lacquer.

j) Fasten the assembled hanger to the back by means of screws (see blue print for size and location of the screws).

The Making of the Vase:

a) Go over the "plan of development" very carefully. Look at the blue print to see how this is done. When you are confident that you know how the layout is made, get a sheet of drawing paper and proceed to lay it out. Be sure that all lines are drawn correctly before cutting it out.

b) Transfer all lines to a piece of tin. All lines for cutting and bending should be laid out. No cutting of lines should be done until all corresponding lines have been checked.

c) Cut on outline with the tin snips.

d) Bend the laps over the sharp edge of a stake with a mallet. Watch the angle to which these should be made. Bend the lateral surfaces. Be sure that the edges are sharp so that there may be no difficulty in shaping the base to the completed sides.

e) Solder the long lap. Bend the base in position. Solder.

f) Form the wire edge. Bend over the hatchet stake.

g) Measure carefully for length of wire to use. The bending can be done very easily by the aid of a vise. The ends of wire should meet in about the middle of a side and after being bent should spread about ⅛ in. In other words, the ends should not overlap.

h) The wiring can now be done by the use of a pair of pliers. Be especially careful not to mar the tin with the pliers.

i) Drill a ⅛-in. hole in each side just above the base. This is to allow all surplus water to pass out into the trough. To do this, insert a piece of wood in the vase, grasp the wood in the vise. After marking the points for the drill holes with a prick punch, drill through into the wood. This method will not leave a burr on the metal after the hole is drilled.

j) Punch small holes through the metal, just below the wire edge. These holes are for the chains. They may be placed in the corners or in the middle of the sides. The number of holes depends upon the number of chains you are to use.

The Making of the Trough:

a) Lay out the development on drawing paper. Follow the dimensions very carefully.

b) Transfer the design to the tin. Cut out with tin snips.

c) Bend and solder corners.

d) Wire the edge. Use the same method as you did in wiring the vase.

e) Solder the vase to the bottom. Before soldering be sure that there is a good contact, so that after the soldering is completed no water can get through between the vase and the trough.

Decorating the Vase:

a) Use a mill file to smooth all sharp edges and a piece of emery cloth for all rough spots. Do not undertake to apply any finish until this is done.

b) Cover the entire surface with an iron filler. Let stand until the surface is thoroughly dry.

c) Apply a coat of lacquer to the outside surface. Let stand until thoroughly dry. Put on a second coat if necessary to get the desired results.

d) Very pretty effects may be obtained by making the edges a different shade. Do this after the final outside coat.

e) Select an appropriate transfer and apply. Follow the directions given by the manufacturer of the transfers.

How to Fasten the Vase to the Hanger:

a) For this purpose, a small-linked brass chain may be used. Cut as many 6-in. lengths as you have decided to use. Fasten these to the vase and to the ring.

b) Before you turn in your completed project to the teacher for his O.K., check over every point and see if it is made according to specifications.

Questions and Problems:

a) What mathematical term is applied to the shape of the body of the base which you made? What term is used for each side? Each edge?

b) What term is applied to the shape of each side? Measure and find the area of one side.

c) How many square inches of tin are needed to make the completed problem?

d) What would be the entire cost of the tin at 20 cents per square foot?

A HINT FOR THE MACHINE-SHOP TEACHER

George C. Donson, Supervisor of Manual Arts, Washington, Pennsylvania

Battered vises and badly scratched lathes are found in most school shops. To avoid such conditions we have tried the following method with good success. In the beginning of the term we try to impress the pupil with the fact that these machines and vises cost considerable money and that they are placed in the school for the use of the pupils, and that they are to be used by the student as if he were the owner of the machines.

We noticed that a boy filing at the lathe would invariably clean his file by striking the file against the shears or carriage of the lathe. It cannot, of course, be expected that a boy will walk across the room to find a place to clean his file, hence we placed wood blocks on each lathe to be used by him for this purpose. But the blocks soon were moved around and would usually be elsewhere when needed. We therefore instructed the pupils to use the top of the tool-post setscrew as the place for tapping their files for cleaning. After the top of this screw is well scratched up, it can be refinished. We experienced the same difficulty in the use of the vises. The wood blocks on the benches help here and if they are not at hand, the ball on the vise handle comes in handy. School machinery should always look as though it were being used, but it should be used in a way that reflects credit upon the students and upon the school.

WHO NAMED THE MONKEY WRENCH?

W. M. Gooch, Atlantic Highlands, N. J.

Numerous articles have recently appeared stating positively but erroneously that the monkey wrench derived its name from James Monckey, its inventor. I do not know the source of this information, but the authors must have come to this conclusion only through unreliable hearsay.

Upon reading the statement several times, my curiosity was aroused and I endeavored to learn more about it. I wrote to the editors of the publications and they referred me elsewhere. I wrote to prominent manufacturers of monkey wrenches and they frankly admitted that they themselves didn't know. I searched through libraries. Librarians made searches for me. But I got nowhere until finally a manufacturer suggested that I write to Frank L. Coes of Worcester, Mass.

From Mr. Coes I have obtained information which appears to me to be logical. Much of it is authentic. He himself has done considerable searching in the field both here and abroad to ascertain whether a Mr. James Monckey had ever been granted a patent in this field. No trace whatever could be found of the name "Monckey" in any country, as an inventor or maker.

It is claimed that in the early part of the nineteenth century, an English patent was a very hard thing to obtain and therefore little used. It is possible, under these circumstances, that the name "monkey" is of English origin, but there is no documentary evidence to that effect.

It is true that a patent was issued to a Mr. Monk for the improvement of pipe wrenches, but this is neither the name "Monckey" nor the type of wrench being discussed.

There is evidence that a Mr. Trask wrote Mr. Coes' grandfather late in 1865 to the effect that the term "monkey wrench" had been in use long before that time. Mr. Trask said he believed the name came with the first use of the English wrench. He suggested that it probably was so called because you "twisted its tail to make it open its mouth."

From this material, I conclude that "Monckey" was not the name of the inventor of any sort of wrench, but a term applied to it, possibly for the above-named reason. Mr. Trask's explanation seems a plausible one. Mr. Trask was proprietor of the Trask Foundry, Springfield, Mass., at which Mr. Loring Coes worked in 1839-40 or 1840-41 as gear patternmaker. The aforementioned Frank L. Coes is the grandson of Loring Coes.

Along with this misconception of the derivation of the name, there also goes the misconception as to how generally the term is used. This particular type of wrench is not universally known as the "monkey wrench." It is not always sold as such nor ordered as such. "Screw wrench" is the name which large buyers prefer. There is nothing definite or universal in the nickname. In fact, it is not used in the south at all, except where there has been, for a long period, an influx of northern white mechanics. In some sections they call this wrench spanner and in others screw spanner, both of these terms being direct importations from England and Scotland.

Over a period of twenty years, incoming orders were watched by a large concern and never once was the term "monkey" applied to a wrench on a wholesale order. In other words, the term "monkey wrench" is seldom if ever used by people dealing in them on a large scale. In time, the name will undoubtedly be dropped entirely.

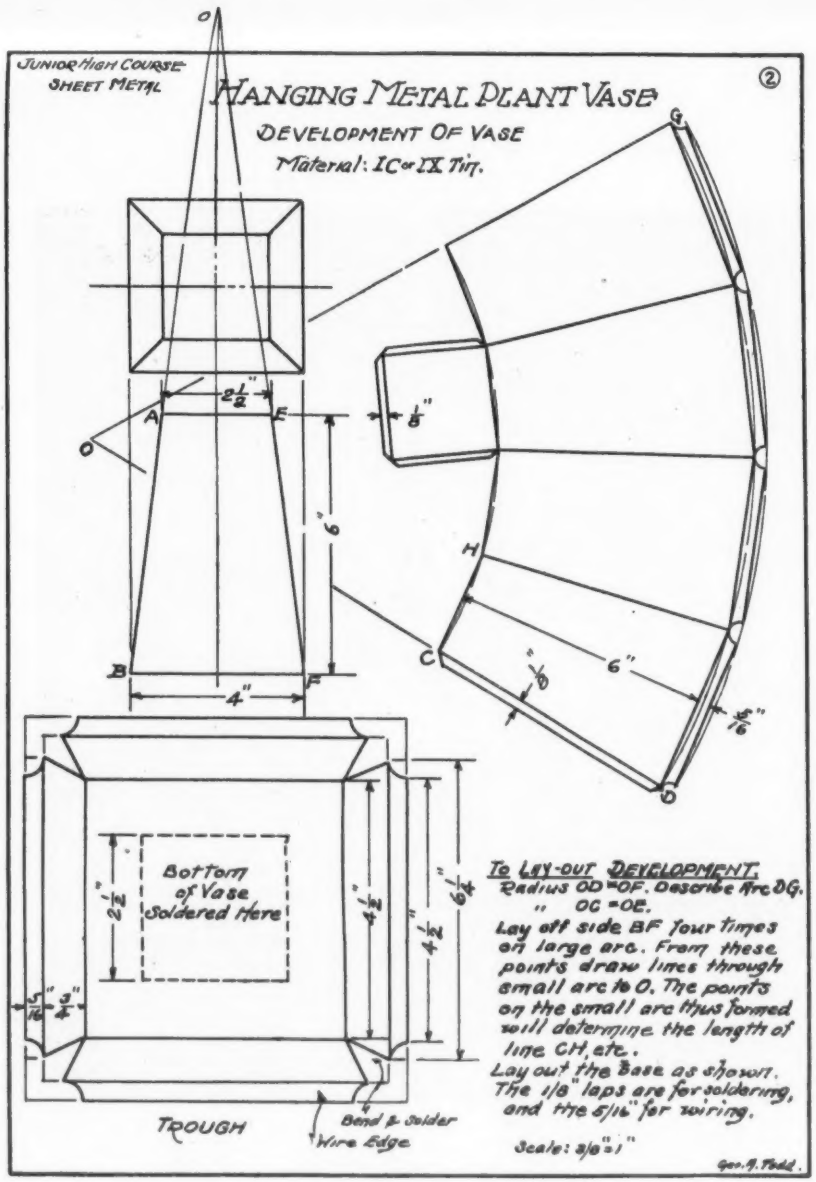

JUNIOR HIGH COURSE
SHEET METAL
HANGING METAL PLANT VASE
②
DEVELOPMENT OF VASE
Material: IC or IX Tin.
2½"
⅛"
9"
4"
6"
Bottom of Vase Soldered Here
TROUGH
Bend & Solder Wire Edge
To LAY-OUT DEVELOPMENT.
Radius OD = OF. Describe Arc DG.
" OC = OE.
Lay off side BF four times on large arc. From these points draw lines through small arc to O. The points on the small arc thus formed will determine the length of line CH, etc.
Lay out the base as shown. The 1/8" laps are for soldering, and the 5/16" for wiring.
Scale: 3/8"=1"
Geo. A. Todd.

FIG. 2. DEVELOPMENT OF A PLANT VASE WITH SQUARE BOTTOM.

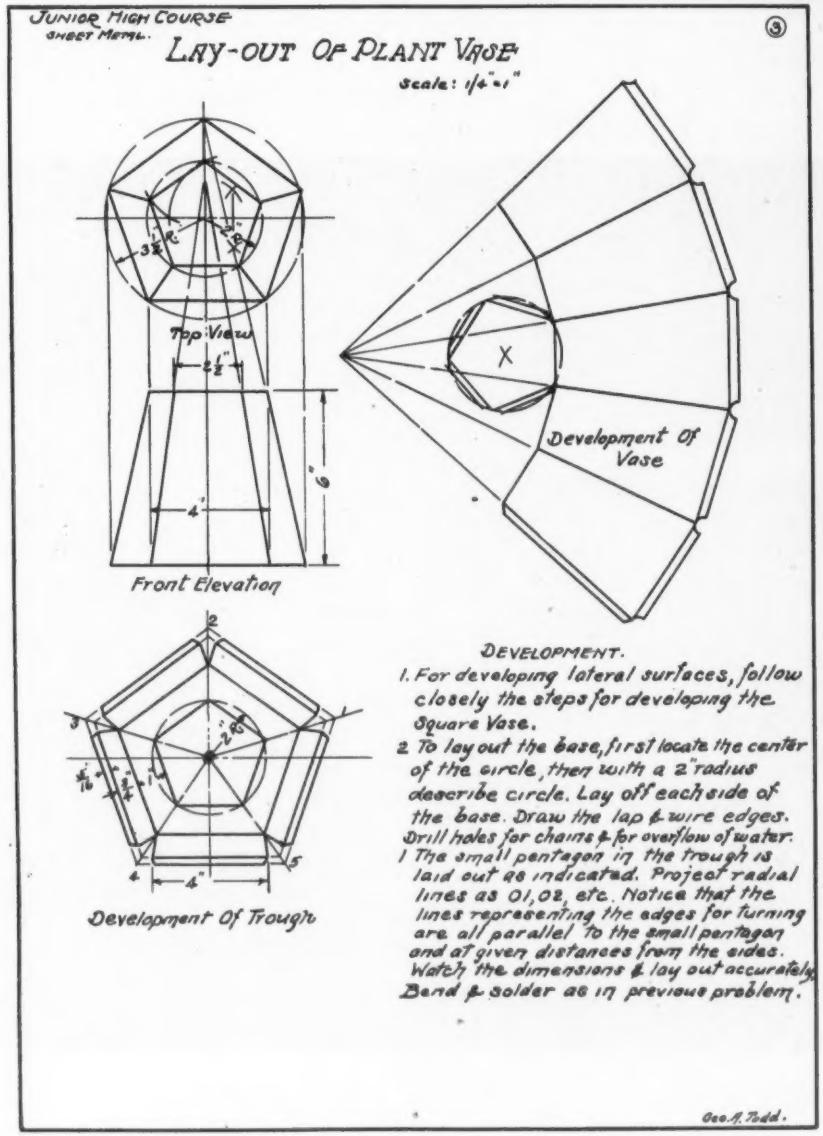

JUNIOR HIGH COURSE
SHEET METAL
LAY-OUT OF PLANT VASE
③
Scale: 1/4"=1"
Top View
Front Elevation
Development Of Vase
Development Of Trough
DEVELOPMENT.
1. For developing lateral surfaces, follow closely the steps for developing the Square Vase.
2. To lay out the base, first locate the center of the circle, then with a 2" radius describe circle. Lay off each side of the base. Draw the lap & wire edges. Drill holes for chains & for overflow of water.
1 The small pentagon in the trough is laid out as indicated. Project radial lines as 01, 02, etc. Notice that the lines representing the edges for turning are all parallel to the small pentagon and at given distances from the sides. Watch the dimensions & lay out accurately. Bend & solder as in previous problem.
Geo. A. Todd.

FIG. 3. DEVELOPMENT OF A PLANT VASE WITH PENTAGONAL BOTTOM.

THE HOUSE OF DELEGATES OF THE AMERICAN VOCATIONAL ASSOCIATION, LOS ANGELES, DECEMBER, 19, 1927.

A USEFUL PROJECT IN STONE CARRIED OUT AT BLOOMINGTON, INDIANA

Earl Bullock, Indianapolis, Indiana

Perhaps the most extensive program to be inaugurated in the vocational department of any high school in the country is that which has been started at Bloomington, Ind., under the direction of E. L. Murray, faculty director. In Bloomington, the mind naturally turns to building stone. The department has therefore undertaken construction of a $50,000 stone mill.

About a year ago the students of the high-school vocational department worked out an ambitious program to interest the board of school commissioners, the stone quarries, and the mill representatives of the district to a point where they would lend their support to the building program.

As a result of this program, 72 high-school students started on the erection of a $50,000 building which they will build from the foundation to the roof. This feat is without precedent, and the size of the building in itself is worthy of consideration. Concrete foundations for a building 50 by 90 ft. has been planned, and walls of solid stone will rise to a height of 20 ft. before late spring.

One end of the building will be two stories high to accommodate offices and drafting rooms. The remainder of the structure will be only one story in order to facilitate the handling of large cranes and carriers in the main workroom.

A mass of masonry weighing 1,550,000 pounds was laid out by the drafting classes and is being shaped into building blocks by the cutting and carving classes of the department.

Mr. Murray, the faculty director, has placed two boys of the advanced classes in charge of the actual construction of the mill.

Originating with Bernard Jackson, an early pupil, of Mr. Murray, the idea of the students erecting their own stone mill spread rapidly among the embryo stonemasons. Classes of the stone vocational courses for decades to come will have adequate working facilities in the new building.

Sympathetic listeners were found among the owners of large quarries when the project was started and 17 carloads of stone were donated to the class. It is expected that 7,000 cu. ft. of stone will be required in the structure. Desiring to be connected with such a useful project, the mills of the district agreed to donate several units of costly machinery to equip the mill.

As the present quarters and equipment for the classes are very inadequate, great ingenuity has been used in making the best of the new quarters. An old gas engine rigged up to run backwards by means of an electric motor, supplies the needed compressed air to operate the drills for the carving class.

Mr. Murray has spent five years in developing the masonry department and has a collection of urns, bird baths, stone seats, vases, benches, pedestals and many plaques carved in bas-relief, all of excellent workmanship, as a collection of his students' work.

ECHOES FROM THE LOS ANGELES A. V. A. CONVENTION

Across the wastes and the deserts in 1771 came the early fathers bringing Christianity and moral order. Junipero Serra and his associates left in their trail those beautiful names for great western cities in a Los Angeles, San Francisco, Sacramento, San Pedro, Santa Monica, etc. A civilization in centuries has followed, influenced and touched by a great, growing democracy.

Across the deserts and snow-covered mountains came 130 fathers of vocational education bringing the great message of virile American vocational education as an educational opportunity for the great west. They came in goodly numbers, these missionaries of vocational education, a Dennis, an O'Leary, a Small, a Prosser, a Wright, a Cooley.

With open arms the good Indians of the west received the missionaries of the east. A Lee, a Beswick, a Johnson, a Kienholz, a Kunou who had come east time and again were now given the great opportunity of hospitality and reciprocity.

And how was this reciprocity handled? Anyone who attended will tell you. Not only was Edwin A. Lee a great leader for the A. V. A., but he also knew how to surround himself with able men and women who took care of the visiting delegates with true western hospitality. One fears to name anyone because somebody who is equally worthy of mention might be forgotten.

The one outstanding thing that every delegate no doubt must take home is the earnestness displayed at every meeting.

The general programs which started at 2 o'clock each afternoon, were regularly attended by 1,000 or more. The sectional meetings were equally well attended. Take the case of the industrial-arts section; on Saturday afternoon at the first meeting the attendance was about 250, the Monday meeting was attended by 350 or more, and the Tuesday round-table discussion was attended by 400 eager, earnest auditors. The same may be said of each and every one of the other sections, those on agricultural education, civilian vocational rehabilitation, commercial education, home-economics education, part-time education, teacher training, trade and industrial education, and vocational guidance.

What can we expect to get out of these exchanges of ideas—ideas which were brought by men who came from every state of the Union, from Canada, Hawaii, and Mexico? It will mean a better understanding what vocational education means; it will mean the gradual adoption of a common terminology; it will mean the more sympathetic understanding of the other man's problem, the realization that a common solution is after all not what is to be looked for. It will mean the solution of our own problem, by adapting from the experiences of others, and adding thereto what our own earnest experimental effort has found effective. This broad discussion of a gigantic problem must impress the thinking school official and teacher with the saneness of the old negro's advice, "We must keep ouah hades up and ouah feet down."

The Newly Elected President of the A. V. A.
R. L. Cooley,
Director of Vocational Education,
Milwaukee, Wis.

Charles R. Allen Honored

The annual banquet was held on Saturday evening at the Biltmore Hotel. At this banquet Charles R. Allen, the dean of vocational education in America, was presented with a watch by his many admirers in the school field. The presentation was made by C. A. Prosser, director of Dunwoody Institute, Minneapolis, Minn.

High-school students added to the entertainment on this occasion by giving a beautiful pageant, symbolic of early Californian history. The seriousness which brought these hundreds from all parts of the American continent was leavened with the enjoyment of social intercourse and the exhilaration of a sociable dance.

On Monday the serious thread of discourse was again taken up. Such men as Leon R. Richardson, director of university extension, University of California; Geo. P. Hambrecht, state director of vocational education, Madison, Wis.; R. L. Cooley, director of vocational education, Milwaukee, Wis., and C. A. Prosser, director of Dunwoody Institute, Minneapolis, Minn., discussed the weighty problem of adult education.

R. L. Cooley Elected

At the annual business meeting of the house of delegates of the American Vocational Association, R. L. Cooley, director of vocational education of Milwaukee, Wis., was unanimously elected president of the association. Charles W. Sylvester, director of vocational education of Baltimore, Md., was elected treasurer; Emily G. Palmer, director of research of the University of California, as vice-president in charge of part-time education; L. R. Humphrey, state director of vocational education, Utah, as vice-president in charge of agricultural education; Z. M. Smith, state director of vocational education, Lafayette, Ind., was elected to succeed himself as secretary of the American Vocational Association.

R. O. Small, state director of vocational education, Boston, Mass., read the report of the resolutions committee. In these were expressed the appreciation of the success of the convention which had brought 1,000 or more from all over the United States, Canada, Mexico, and Hawaii; and of the cordial reception and unexcelled entertainment given to the delegates. This he summed up excellently in these words, "California, thou fairest mother; Los Angeles, most gracious daughter and host, we salute you, we thank you, we love you."

He also thanked the INDUSTRIAL-ARTS MAGAZINE for its cooperation and the publicity which it had given to the convention, and all others who had helped to make the convention a success.

Resolutions of condolence were passed commemorating the death of Lewis Gustafson, who at his death had been treasurer of the American Vocational Association, and Dudley M. Hughes, congressman from Georgia, one of the authors of the Smith-Hughes bill.

One of the most important resolutions petitioned Congress to extend agricultural education to help the farmers to educate themselves in their vocation.

The Convention Daily

One of the finest contributions made by the convention publicity committee of which Albert E. Bullock, supervisor of commercial education for Los Angeles, was the chairman, was the daily paper in which appeared extracts of all of the convention speeches and events. The value of this 16 by 22-in. four-page paper which was printed by the students of the Los Angeles Polytechnic High School, cannot be overestimated. Delegates could concentrate on what the speaker said rather than on the mechanics of note taking. This service rendered by the publicity committee has set a mark for all future times. The great value to the delegates who naturally were interested in more than one of the sectional meetings was that the information of what had taken place at any and all meetings was not only accessible but in such form that it could be obtained for permanent record. The publicity committee and the school printshop are to be commended for their able work.

The Bruce Attendance Bulletin

As usual the Bruce Attendance Bulletin was in evidence. It is to be noted that the bulletin records the attendance of delegates under the following headings: United States Government Departments; State Departments; City Supervisors and Directors, Universities, Training Schools, Heads of Departments, etc.; Trade Commercial Associations; and Unclassified. This explains the fact that while the total attendance at the convention exceeded 1,000, there were only 480 who came under the headings just enumerated. Of these 130 came from points east of the Rocky Mountains, and about 300 from the State of California.

The American Vocational Association is to be congratulated that it was able to hold so successful a convention so far away from the beaten path trodden by those who are primarily interested in vocational education. California, and especially Los Angeles, can feel justly proud of the manner in which it took care of its task. The delegates from the East will long remember the sentiments expressed in your editorial in the Tuesday issue of the A. V. A. Convention Daily:

"ADIOS, AMIGOS NUESTROS"

"The farewell of the soft-spoken Spaniards who founded Los Angeles, City of the Angels, was 'Adios' ('To God'). In our Goodbyes, we would echo that devout commitment—'Adios,' Nuestros Amigos. For a little while you have been with us and we have welcomed the opportunity of knowing you and having you in our community. Now as you leave us, the parting brings genuine regret. We hope you have enjoyed Los Angeles, its stimulating vistas, its magnificent distances, its beaches and mountains, its homes and buildings, and all of the charms which have been pointed out to you and placed at your disposal. We hope also that the Convention has meant much to you in revival, encouragement and spiritual uplift. As you leave us, we invite you to come again. We are happy to have had you with us, sorry that you must so soon leave, and anxious for you to come back to us. May God's providence and blessing be with you in our separation. Adios."

INDUSTRIAL EDUCATION IN THE UNITED STATES IN 1924-1926

Mr. Maris M. Proffitt, in a recent bulletin of the U. S. Bureau of Education, entitled "Industrial Education in 1924-1926," discusses the field of industrial education, manual arts in the junior and senior high schools, itinerant work, home-mechanics courses, general shops, occupational information and guidance, part-time, evening, and apprenticeship courses, and vocational training for disabled veterans.

A survey of educational literature, of courses of study both in the public schools and teacher-training institutions, of the programs of educational conventions, of conference reports, and of special reports from many school systems has led to the conclusion that more activity has been manifested during the past two years in the study of problems involved in the manual-arts work and industrial forms of education than in any similar period in the past. In the field of the manual arts, much attention has been given to the objectives to be included and to the types of organization to be used in making this type of work an important factor in the accomplishment of the ends of public education.

There is a growing conviction that manual-arts courses can make a unified and direct contribution to the school program, and that they constitute the best agency for realizing some phases of the accepted aims for public-school education. The reorganization of the manual-arts work by the state education department of Maine and the revision of the course for Racine, Wis., are examples of a general movement to give the manual arts a place in the program of studies comparable with the contribution they can make and to organize them on a plan that will insure the greatest returns. At the present time there appear to be three functioning objectives, namely:

1. Training for the creation of an industrial product or service. For example, training for carpenters, bricklayers, welders, pattern-makers, foundry men, and tailors is for the purpose of providing an industrial product. Such courses are for definite training experience in some specific trade or technical subject with a view to employment in industry.

2. Training in the use of industrial products and services common to homelife and leisure-time activities, and which are of a nonvocational character. For example, training in the common and ordinary use and care of such industrial products as furniture, automobiles, electrical machinery, and apparatus, and for such industrial services as electricity, gas, and water in the home.

3. Training in exploratory and developmental forms of experience. Courses offered for the realization of this objective include projects in a variety of activities, such as woodworking, metal working, painting and electricity. The character and quality of the work should be on a level comparable with the interest and achievement ability of the pupil. The work is not intended to give the first part of several trade courses, but to provide the individual opportunities to react in connection with a variety of materials, tools, and operations, thus furnishing opportunities for educational development and creating additional experiences for the discovery of aptitudes and interests. The general shop, when well planned as to equipment and projects, is an excellent organization for realizing this objective.

Mr. Proffitt points out that three classes of objectives listed are clearly differentiated as to purpose and while a course under one objective may have limited values for one or both of the others, the purpose of the course is distinctly for the realization of the one objective for which the course is planned.

In the senior high school, Mr. Proffitt points out that the inclusion of manual-arts courses in the group of elective subjects has received recognition as an essential in the high-school program. Such courses provide opportunities for those pupils who have chosen some other field of work as a major in their high-school course, as commercial or college preparatory, to elect for one or more years a shop course in which they may learn something about the manipulation of tools and be able to do creative work in materials. They obtain training that results in increased efficiency in the performance of nonspecialized tasks of an industrial or technical nature, which are commonly performed by the great majority of individuals and which are associated with homelife and leisure-time activities. These courses often form the basis of an avocation in the later life of such pupils.

Such courses are valuable in meeting the needs for general intelligence, technical knowledge, and manipulative ability of a nonspecialized nature associated with the selection, purchase, and care of furniture; the selection, operation, and care of electrical apparatus and appliances in the home; the care and operation of an automobile; the selection and care of plumbing fixtures; the use and care of the water service in the home; selection and appreciation of the products of the printshop; radio operation and construction, and blue-print reading.

The development of junior high schools is affecting the organization of manual-arts work for those grades, according to Mr. Proffitt. The peculiar value that this type of work may have for realizing some of the specific purposes of the junior high school is critically studied with the consequent modification of courses, instructional organization, and methods of teaching. The shop activities are increasing to meet the exploratory and general developmental objectives. It is found that in most of the better schools, there is much less of the old, formal type of woodwork, such as joinery exercises, and more work in a large number of shop activities, such as sheet metal, electrical repairing, simple auto-repair jobs, cement construction, woodwork, including wood finishing and painting, and printing, in connection with projects in line with the interests and ability levels of junior-high-school pupils.

The work in New York state is an example of the acceptance of the junior-high-school idea, and as a consequence, it is leading to a rapid increase in the number of schools introducing training facilities and courses in shopwork in grades seven and eight. Many schools are offering general shop courses in grade seven to include instruction in the use of common tools. Such courses include maintenance and repair jobs, woodwork, electricity, automobile mechanics, pipe fitting, and the necessary related drawing in each subject.

The courses offered in grade eight are of a more intensive nature and furnish instruction either for a half year or a full year in some subject started in grade seven, allowing the student to select his shop. For school systems having a full program of industrial courses, the work for the ninth grade is arranged to meet the needs of both those who expect to enter the senior high school and for those who expect to drop out at the end of the junior high school. In the ninth grade of the junior high school in Minneapolis, Minn., for those who expect to continue manual training in the senior high school, one full semester of mechanical drawing is required; for those who expect to major in any other high-school shop course, one semester of either electricity or sheet metal is required; for those who choose printing as a trade, two semesters of printing are required. Boys who expect to leave school at the end of the ninth grade, and who have had not less than twenty weeks of mechanical drawing, may choose any shop course or combination of courses that best fit them for the work they intend to follow.

Mr. Proffitt finds that much interest has been manifested in the last two years in the development of home-mechanics courses in non-

vocational types of industrial work. The projects in these courses are selected with particular reference to the activities about the home or the farm and have functional value in connection with repair and simple construction jobs. Included in these jobs are repair jobs for windows, doors, plumbing, and lighting fixtures, and furniture. Sometimes work is given in concrete and leather.

The general shop which is a recent type of work in a number of shop activities under the supervision of one individual, has grown in favor, especially for work in the junior high school. Of 1,500 representative school systems which reported to the Bureau of Education, more than 40 per cent stated that they had organized a general shop course. More than one fourth of these were begun within the last two years, and 10 per cent of all the schools having general shops started them within this period.

The majority of the general shop courses are organized on the plan of a single shop, to include work in all the activities offered in the course, rather than on the basis of a cycle of shops, through which the students are routed as a group for a limited period of work in each activity. The comprehensive shop plan makes it possible for a pupil to work continuously on a project involving more than one activity until it is completed.

In addition to group and individual instruction, students are provided with job and information sheets which are an aid to individual progress. A record is kept of the projects completed by each student and the grade made on each. It is thus possible to tell at any time the progress that a student has made.

During the past two years there has been a decided tendency to put into the school curriculum, either in the junior or senior high school, courses in occupational information for the purpose of developing intelligence which will function in furnishing general education values and specific values for vocational guidance. More than one fifth of the 1,500 schools reporting added occupational-information courses to their curricula for the first time during the past two years, while of the schools offering such courses, more than one half inaugurated them during the same period. About one half of the schools offering an occupational-information course make it a required subject for all pupils of a given grade.

The courses offered in the different schools vary both in content and organization for instructional purposes, but in general all set up direct and indirect forms of experience which furnish information relative to occupations and which may be a means for the discovery of a personal interest in some occupation or occupational group that will lead to a life interest.

THE RELATION OF INDUSTRY TO EDUCATION

Miss Clare K. Tripp, who spoke recently before the western division of the Washington Education Association, on the subject "The Relation of Industry to Education," traced the progress of industry in the state for the past century, pointing out that the first financier in the state was a certain Mr. Bush, who had successfully transported a few hundred silver dollars across the country. Mr. Bush, who was a man without a country, because at that time the United States government did not grant citizenship to members of the colored race, made the acquaintance of Mr. M. T. Simmons of Fort Vancouver. These men took granite rocks from Mud Bay, hewed them into grist-mill stones which they sold to grist mills, and thus established the first industry with private capital.

Miss Tripp showed the development of industry in the far west, concluding with a description of the present status of development and production, giving figures on the value of production, and comparing the basic-industry production with diversified manufacturing, together with wages, working, and living conditions of the factory employee.

Miss Tripp then gave a history of the growth of the educational facilities and the standards bringing the ideal and practical together over a period of a hundred years. She showed that it is important that vocational teachers and supervisors know something about the placement of the youth of America, and that they develop them according to industrial needs, and allow them to seek their own vocational inclinations and aptitudes. She said that the industrial leaders have a right to expect that students in the schools will be properly prepared for entrance into the industries, with at least some understanding of the value of the industry to the community. The men in the industries should, on the other hand, be willing to assist in the education of the young men and women of the country, both with financial means and with their moral support.

On the whole, the development of industry and education has progressed side by side, with industry furnishing the financial background and a market for the product being produced through education. While the beginning of industry in Washington was started by an illiterate, today the demand for highly trained citizens is an ever-increasing challenge to the educational institutions of the state.

JOB ANALYSIS SHEET IN WEST VIRGINIA

Since July, 1927, vocational agriculture departments in the schools of West Virginia have been supplied with blanks and are using the series of job analysis sheets, comprising (*a*) the enterprise analysis, (*b*) the job analysis blanks, and (*c*) the annual teacher-layout sheets.

Under the system in operation, a separate enterprise analysis sheet is made out for each individual enterprise taught, listing the main jobs or problems of the enterprise. For example, growing corn for grain is an enterprise, and securing seed is a job or problem. There are not more than five to ten enterprises taught in a given year and this requires the use of ten to twenty enterprise analysis blanks for a two-year course.

The job analysis sheet is not used as a teaching plan but is made the basis for the teaching plan. The teaching plan may be kept or destroyed after use. The job analysis sheet becomes part of the

SELF-ANALYSIS CHART OR REQUIREMENTS FOR GRADES IN PRINTING

B. B. O'Neale, Princeton Junior High School, Youngstown, Ohio

Grading		Conduct	Attitude	Workmanship	Accuracy	Care of Materials	Achievement
		General behavior while in class	Reaction toward work	Spacing, justification of lines and handling type	The number of mistakes per line or per proof	Neatness and Order	Based on straight matter composition 10 point type, 20 picas wide
1	Excellent 93-100	Gentlemanly always 15 points	Sticks with job until finished 15 points	Requiring very little help from the instructor or helper 15 points	Keeps his mind on the job Makes no mistakes 15 points	Everything in its place bench clear of all materials type in galley 20 points	15 lines per hour 15 points
2	Good 87-93	Gentlemanly when instructor is present 14 points	Sticks with job when instructor is present 14 points	Able to do work with one demonstration Gives attention and demands understanding of demonstration 14 points	One mistake per proof or drawing 14 points	Any one of the offenses in last column 18 points	12 lines per hour 14 points
3	Fair 81-87	Gentlemanly when watched 13 points	Sticks with job only when watched 13 points	Has ability to go ahead but requires more than one explanation 13 points	Two mistakes per proof or drawing 13 points	Any two of the offenses in last column 16 points	10 lines per hour 13 points
4	Unsatisfactory 75-81	Not Gentlemanly 12 points	Can't work must talk 12 points	Gives little attention to explanation and does not possess skill or knowledge to do correct work 12 points	Three mistakes per proof or drawing 12 points	Any three of the offenses in last column 15 points	8 lines per hour 12 points
5	Failure Below 75	Troublemaker 12 points	Loafer 12 points	Gives no attention 12 points	Four mistakes per proof or drawing 12 points	Envelope left out, lesson sheets left out proofs left out type left in stick type on floor type materials on frame 12 points	6 lines per hour 12 points

Explanation—If a Pupil Makes 2 in Conduct, 3 in Attitude, 2 in Workmanship, 3 in Accuracy and Care of Materials, and 2 in Achievement, He Will Make 84 Points, or a Grade of 3. Demerits and Offenses in the Last Column Should be Deducted from Total Points Made.

permanent record of the school and is filed in a folder labeled job analysis 1927-28. The job analysis sheet lists operations and decisions in one column, and methods in the second column. The reverse provides for notes on real situations and reference material which has proved valuable.

The annual teaching-layout sheet is made out in duplicate and gives special attention to teaching done during the summer months. One copy of the layout is made a part of the permanent file, while the other part is sent to the state supervisor for recording. A typical job analysis sheet is reproduced below:

Operations	Methods
Knowledge likely to be useful in solving the problem or doing the job. Finding out characteristics of superior varieties of the types in use and adapted to the region, and suitability to varying conditions and purposes. Finding out economy in using good seed of a high-yielding strain. Finding out conditions which make it desirable to buy seeds; to select own seed. Finding out risks in using seed from outside of the region. Finding out standards of amount of seed required for a given area. Finding out characteristics and standards of the sound-type ear, kernel, stalk for superior variety chosen. Finding out standards of maturity of ear and stalk, and factors of conditioning. Finding out disease conditions to watch for in selecting seed. Discovering significance of field selection as against bin or shock selection. Using good procedure in field selection. Sources of seed if purchased. Note: Securing may be interpreted to include drying and protecting seed and testing seed.	Teacher's general plan of assignment, supervised practice, observational studies and classroom instruction for doing the job: I. Assignment — Set up the problem of securing seed corn for home farm. Through discussion develop a line of inquiry as to ways of solving. References: (*a*) Home and neighbors, farms, and farmers; (*b*) bulletins and books. II. Observational Study and Inquiry—(*a*) Class-group study stand, stalk, ear in the field; (*b*) individual inquiry and survey of home and neighboring farmers' practices and conditions. III. Supervised Practice — (*a*) Class group select seed corn for farmers (demonstration by teacher); (*b*) each boy selects corn for his own enterprise and for home farm. IV. Classroom — (*a*) Study of sample ears of varieties to get type—boys bring corn and teacher supplements; (*b*) class discussion—pooling reports of surveys and readings; observational studies and practice. Summary of results.

ASSOCIATION AND CONVENTION ACTIVITIES

THE NOVEMBER MEETING OF VOCATIONAL EDUCATION SOCIETY OF BOSTON

The November meeting of the Vocational Education Society of Boston was held at the Hotel Westminster, on Saturday, November 12, with Mr. R. W. Babb presiding. About forty members were present.

Mr. Elmer W. Green, of the Christian Science Monitor, who was the first speaker, talked on "Photo-engraving from the Teacher's Standpoint." Mr. Green pointed out that photo-engraving is not a teaching subject and is not likely to be adopted as a school subject. It is a highly technical industry, subdivided into many special occupations, while the cost of equipment and materials is practically prohibitive. He suggested that the work be taught as a foundation upon which to build a lesson which can be applied in any trade taught in the schools. There are great teaching possibilities in the principles of the craft and no branch of it is lacking in valuable ideas which may be used for the benefit of the pupils in the schools. Mr. Green discussed the photograph, the camera, and the lens and showed how photography opens up other subjects of interest to the pupil. The talk was concluded with a reference to perspective and the suggestion that teachers emphasize perspective to their pupils, giving them an understanding of their relation to industry and to society.—*Frederick A. Coates.*

THE DECEMBER MEETING OF THE BOSTON VOCATIONAL EDUCATION SOCIETY

The December monthly meeting of the Boston Vocational Education Society was held at the Hotel Westminster, on Saturday, December 10, with a fine attendance.

Mr. James A. Garvey, employment manager of the Dennison Manufacturing Company, who addressed the meeting, talked on the subject, "Training the Worker." Mr. Garvey showed that the attitude of industry toward vocational education fluctuates with conditions. When there is a surplus of jobs and a shortage of persons to fill them, industrial leaders are inclined to blame the schools for doing nothing to begin to take an interest in vocational education. During periods when there are few positions and many applicants, business loses interest in the training program.

Mr. Garvey pointed out that training for industry had its first expansion during the world war. The shortage of labor was acute, especially in the skilled industries. Many firms established training departments of their own, while the courses offered by the public schools were eagerly sought. In 1920 and 1921 the reaction set in and business suffered serious reductions in nearly every line. In the retrenchment which followed, many training programs were eliminated and there are now few industrial concerns with training programs in operation.

The Dennison Company, said Mr. Garvey, passed through this period, though it did not abandon its training program, and today has a healthy specialization of the training function. In the beginning, the company used the pickup method in obtaining new workers for skilled jobs but later came to realize the defects of such a policy. It was noted that training of this type is expensive, even though the costs are distributed and concealed. From this policy, the company went to the opposite extreme, establishing a school as an entirely separate department. The school which was a "vestibule" through which the learner passed before entering the plant, flourished from 1918 to 1920.

Though the idea appeared to be theoretically sound, the school was not an entire success. The foremen and skilled workers felt relieved of the responsibility for new employees and took little interest in the newcomers. Again, the expense was excessive due to the equipment, the floor space used, the supervision, and the handling of the material and product. In times of depression the cost of the school department could not be effectively limited and for a time the discontinuance of the school was considered. Later a new solution of the problem was evolved and the training program was placed upon the basis upon which it is now maintained. Under the plan, the task of training workmen was again placed in the production departments and staff assistants were added to aid the foremen and to follow up the trainees. Under this plan, the main overhead cost of the department is the salary of the director and that of his assistants. No equipment or material is tied up and the foreman has the entire responsibility over the new employee and his training. The training department keeps records of new employees, compares the progress made with normal progress, and orders transfers to other departments where the individual has difficulty in learning a particular work. In each department, a skilled worker with some teaching ability assists the beginner, without any additional expense to the company. The plan has proved very successful in the training of workers for varied types of work ranging from electrotyping to crepe-paper making. At present there is a period of employment depression and the instructors have become producers until they are called upon to resume their training functions. The department head and his assistants in slack times take the opportunity of making valuable studies, and they have made studies of mechanical aptitude and intelligence tests for possible application in the work.

In the matter of reducing the labor turnover, Mr. Garvey gave figures showing how individuals are transferred from one department to another because of failure to make satisfactory progress in the former place. Of 200 such transfers a year, it is noted that less than one eighth fail to make good in the new place. A large proportion of those transferred not only succeeded in the new work but earned increases in pay in a short time. In saving these valuable employees, the training program has been able to demonstrate its effectiveness in training and placing employees: Mr. Garvey's talk was of great interest to the members and was voted the best talk the society has had in some time.—*Frederick A. Coates.*

THE MARYLAND VOCATIONAL-ASSOCIATION MEETING

The fifth annual meeting of the Maryland Vocational Education Association was held on Friday, November 25, at the Southern Junior High School, Baltimore, Md. Chas. W. Sylvester, president of the association, was in charge of the meeting. There were about 125 persons present.

Miss Anna E. Richardson, field worker in child development and parental education, American Home Economics Association, Washington, D.C., spoke on various phases of child development and parental education. She stressed the importance of environment and its effect upon the child, and emphasized the fact that a girl's education could not be improved greatly until her environment was changed. The many misfits, both in occupations and society, Miss Richardson pointed out, show the need for more careful and thorough training of girls both at home and at school.

The second speaker was Dr. Lewis A. Wilson, assistant commissioner for vocational and extension education, state department of education, Albany, N. Y., who addressed the meeting on "Modern Trends in Vocational Education." Dr. Wilson outlined the social changes taking place in vocational education and pointed out the changing conceptions in American education. As the two become more varied and more complicated, it is important that training in vocational education be given along more scientific lines. The biggest problem of vocational education, in the opinion of Dr. Wilson, is the training of the boy or girl who leaves school at an early age.

The business meeting followed the general program. The president briefly outlined the work of the Association during the past year, and stated that brief reports of the general and sectional meetings would be printed in an issue of the Maryland Vocational Education Association News Letter about January, 1928. He stressed the importance of having a large membership in the state association in order that there might be a large representation of delegates to the American Vocational Association in Los Angeles. Mr. J. D. Blackwell and Mr. Chas. W. Sylvester were selected as delegates to the American Vocational Association.

Sectional meetings in agricultural education, commercial education, educational and vocational guidance, home-economics education, and industrial education followed the general program of the Association. Each section had arranged a splendid program which was evidenced by the fact that every section was largely attended. One of the splendid features of the whole vocational movement in Maryland is the fact that the five divisions of education are affiliated with the vocational association and lend their whole-hearted support in the problems which are undertaken by the association.

The following officers were elected for 1927-28:

President, Mr. H. F. Cotterman, Professor of Agricultural Education, University of Maryland; vice-president, Mr. R. S. Williamson, Assistant Supervisor of Industrial Education, Baltimore, Md.; secretary-treasurer, Miss Elsa Haupt, Western High School, Baltimore, Md. —*Charles W. Sylvester.*

THE TULSA MANUAL-ARTS CLUB MEETING

The December meeting of the Tulsa Manual-Arts Club at Tulsa, Okla., was given over to the discussion of some important changes in the manual-arts program for 1928-29. Due to greatly increased enrollment in the junior high schools, it became necessary to add one more shop teacher at each of the schools. As there is insufficient room in the buildings for the present purposes, it has been planned to erect separate shop buildings on the same site as the main buildings. These buildings will consist of three shoprooms, with provision for enlargement as the demand arises. It is planned to have the building plans and specifications prepared by the members of the club and to present these to the board of education for approval.

In line with the idea of suitable shop buildings, Mr. F. C. McCullough of the Central High School, showed a blue print illustrating some of the essential features of the proposed buildings, particularly the woodshop. Mr. R. A. Armstrong of the Wilson Junior High School, presented a blue print showing the essential features of a metal shop. Mr. J. L. Walker of the Field Junior High School, outlined the requirements for rooms for sheet-metal work and electricity. Mr. Perry Carmichael of the Wilson School, made suggestions for standardization of buildings and urged a standardized series of problems. Dr. W. T. Bawden, director of manual-arts work, commented on the fine collection of information obtained and said he would proceed with recommendations for the several shops.

Those present were asked to give their opinion on the question of teaching classes ranging from 30 to 36 pupils each.—*J. W. Bollinger.*

TEXAS INDUSTRIAL-ARTS TEACHERS HOLD ANNUAL MEETING

The industrial-arts teachers of Texas held a meeting on Thanksgiving Day in connection with the annual meeting of the Texas Teachers' Association.

Mr. Randell of Huntsville, gave a report on the program of the manual-arts conference held in Chicago. Mr. T. B. Mayhall of Austin, spoke of the need for properly trained teachers for shop instruction. He pointed out that this type of teacher is badly needed in cities of 3,000 to 15,000 or 20,000 population. There exists a demand for shop teachers who know what to teach, and how to teach it. He pointed to the need for closer cooperation between the supervisors of large systems and the departmental heads of teacher-training institutions.

At the first session, Mr. V. J. Smith of Alpine, talked on the subject, "A Forward-Looking Program for Mechanical Drawing in Vocational Education." Miss Adelaide Baylor of Washington, D. C., who followed, discussed "Reciprocity in the Education of Women and Girls, and Boys and Men in the Prevocational Field." Mr. E. E. Oberholtzer of Houston, spoke on the subject, "Vocational Education in Houston." Mr. Oberholtzer pointed to the great need at present for pioneering in this field, and showed the lack of reliable and definite information on the subject. The question of affiliation credit for work done on the single-hour-period basis was discussed at some length. Mr. N. S. Hunsdon of Austin, then gave a brief report of the work accomplished during the past year. The report was very creditable in view of the fact that no state aid is given for the work carried out.

Among those present at the meeting were Mr. C. H. Sherman, Mr. C. K. Standish of Houston; Mr. Albert McCleland of Ft. Worth; Mr. Robert Davis of Austin; Mr. R. W. Andrews of San Antonio; Mr. T. B. Mayhall of Austin; Mr. J. B. Groves of East Texas Teachers' College; Mr. Ben Thompson of Huntsville; Mr. H. S. Williams of Austin; Mr. G. M. Brown of Houston, and Mr. V. J. Smith of Alpine.

At the business session which followed the program, the following officers were elected for the year 1927-28:

President, Mr. E. L. Williams, College Station; secretary, Mr. Stuart Mackay, Houston.—*L. B. Fields.*

MR. ADAMS HEADS OREGON DEPARTMENT

Mr. Adams, who has been appointed as State Supervisor and Teacher Trainer in Trade and Industrial Education in Oregon, was formerly in charge of apprenticeship and industrial education at Seattle, Wash.

Mr. Adams is a graduate of the Washington Normal School, of the American University in France, and of the University of Wash-

ORVILLE D. ADAMS.
State Supervisor of Industrial Education for Oregon, Salem, Ore.

ington. He has had considerable teaching and supervisory experience, and was for six years in charge of the vocational department at Seattle. His industrial experience was obtained through his work as an apprentice in sheet metal and plumbing, as an assistant to the engineer in a logging railway camp, and as a workman and foreman in the lumber and shingle mills.

MR. PAYNE GOES TO TOLEDO

Mr. Harry W. Paine, formerly an instructor in the Boys' Technical High School, Milwaukee, Wis., has recently become a member of the faculty of the University of Toledo, Toledo, Ohio.

As associate professor of vocational education in the university, Mr. Paine will have charge of the training of teachers in vocational

MR. HARRY W. PAYNE,
Associate Professor of Vocational Education, University of Toledo, Toledo, Ohio.

education, and will also have in charge the foreman-training work which is conducted at the university.

Mr. Paine is a graduate of the Iowa State College at Ames, and of the University of Wisconsin, and holds a B. S. degree in mechanical engineering given by the Iowa College. He has had eleven years of practical experience in the trades and has had considerable professional training to equip him for teaching the trades. He is a frequent contributor to the educational periodicals.

NOW, ARE THERE ANY QUESTIONS?

Treatment of Brass Before Painting or Enameling

746. Q.: I have been endeavoring to find information as to the treatment of brass so that paint or enamel would stick to it without chipping. I am told that there is a solution for washing brass which causes some chemical change in the brass so that paint adheres to it.

Will you kindly advise me in regard to the matter so that I can give the proper instructions to one of the pupils who wants to find out about painting a brass bed? I think he plans to enamel or lacquer it. Should the preparation be the same whether for lacquering, enameling, or painting?—*D. V. O.*

A.: The only practical treatment suited to home mechanics in this class of work, is to strip off all the old finish with strong Gold-Dust solution (1 small package per ten quarts of hot water), rinse carefully with the hose, let dry and then enamel after the metal has been well warmed in a hot room. The only other alternative is to rub all parts with 00 steel wool or a split 4/0 paper. The principal care is to entirely eliminate all traces of grease or oil. The next is to offer some "tooth" for adherence; hence the sanding operation.—*R. G. Waring.*

To Remove O'Cedar-Oil Gloss from a Piano

747. Q.: What is the best procedure to use in restoring the finish on a piano on which has been used O'Cedar oil? It originally had a dull finish but the repeated applications of this oil has given it a very undesirable gloss. Aside from this no apparent damage is noticeable.—*A. V. L.*

A.: Use a soft-textured sponge, well washed out in tepid water. Make up a lather by rubbing the moist sponge on a bar of Ivory soap, and proceed to give the entire case a thorough washing. Rinse all parts as soon as soaped with clean warm water, and then chamois off with a leather wrung out of tepid water. If the case still has too much gloss after it has been washed off and dried, then the only recourse is to use crude oil, felt pad and FFF pumice stone to rerub the case. This will restore the original satin finish. In doing this work, plan the rubbing operations so that all strokes cut off clean where stiles and rails come together around panels, etc.—*R. G. Waring.*

Drawings for Projects

756. Q.: We are building a number of projects in our manual-training department and want to secure several working drawings or blue prints. Have you the following in stock: A medicine cabinet, library table, cedar chest, writing desk, and sewing cabinet?

Please give us a list of articles in which these are discussed. —*H. E. S.*

A.: For the medicine cabinet, refer to p. 86 of the Feb., 1916, issue of the INDUSTRIAL-ARTS MAGAZINE. Another medicine cabinet is shown on p. 24 of the June, 1918, issue:

For library tables see p. 127, Mar., 1917; p. 141, April, 1920; p. 155, April, 1921; p. 342, Sept., 1922; p. 58, Feb., 1923; p. 141, April, 1920; p. 241, June, 1923; p. 408, Oct., 1923.

For the cedar chest, see p. 38, July, 1915; and p. 81, Feb., 1920.

For the writing table, see p. 346, Sept., 1922; p. 421, Nov., 1921; p. 487, Dec., 1923; p. 241, June, 1923; p. 63, Feb., 1920; p. 338, Sept., 1922; p. 359, Sept., 1918; p. 204, May, 1920; p. 363, Sept., 1921; p. 348, Sept., 1927; p. 349, Sept., 1927, and p. 354, Sept., 1925.

Sewing cabinets can be found on p. 162, April, 1923; p. 255, July, 1926; p. 469, Dec., 1927; p. 179, May, 1926; p. 114, Mar., 1918; p. 200, May, 1922.

Plans for the "Spirit of St. Louis"

757. Q.: Could you give me any information on how I could obtain a drawing or print of a monoplane, patterned after the "Spirit of St. Louis," in miniature?—*K. J. M.*

A.: A plan including building and flying instructions for a monoplane patterned after the "Spirit of St. Louis" may be obtained for 25 cents from the Ideal Aeroplane & Supply Co., Inc., 408-412 West Broadway, New York City.

Removing Medicine Spots from Dresser Tops

758. Q.: During a sickness in the home some medicine or rubbing alcohol was spilled on a walnut dresser top and left a white spot. Is there any way in which it can be removed without scraping the finish and refinishing?—*G. B. W.*

A.: First wash the dresser top with Ivory-soap lather and a sponge wrung out of warm water. Dry either with a chamois or let evaporate, after rinsing off the top with fresh water. Use some sort of sprayer to apply a mist of alcohol over the white spot. A medical sprayer carefully operated may be used for this job, as I believe all that is necessary is to bring the shellac of the dresser finish back into solution. If the white appearance disappears, then the method is O. K. Let dry until hard and then rub the whole top with crude oil, felt pad and pumice stone. Wipe clean. If the alcohol does not do the trick, then it will be necessary to strip the top and refinish.—*R. G. Waring.*

Snowshoes

760. Q.: Have you any literature on the making and lacing of snowshoes?—*L. G. P.*

A.: "Camp and Trail," by E. Kreps, published by the A. R. Harding Publishing Company, Columbus, Ohio, describes the various forms of snowshoes and gives complete directions for making and lacing them.

THE EASTERN ARTS CONVENTION

The nineteenth annual convention of the Eastern Arts Association, which will be held April 18 to 21, at Hartford, Conn., will be the turning point in the affairs of the association. The local committee on arrangements has inaugurated a policy which will make it possible to keep pace with the new standards set by the 1928 convention committee.

More than 70 individuals have offered themselves for service on the eleven local committees which have assumed responsibility for the success of the convention. The work of all committees has been outlined and each member has taken his own share of the work.

Preparatory to the meeting, a campaign has been started for new members. The slogan adopted is "Two-Thousand Members for 1928." Of the estimated 30,000 teachers and supervisors eligible to membership in the association, only 1,500 joined their professional association.

The headquarters for the convention will be in the Hotel Bond. All meetings will be held in the auditoriums of the Hopkins Street Building and the Broad Street Building of the Hartford High School and the Woman's Club Building directly opposite. The headquarters, convention halls, and exhibition rooms are all within five minutes' walk of the railroad station and everything is being done to make the visiting delegates comfortable.

The exhibits will be housed in the state armory, which is only a short distance from the meeting halls and which provides 50,000 square feet of space for the apparatus and materials to be displayed.

A feature of the convention will be a large and extensive exhibit of work in fine arts, industrial arts, manual arts, and household arts from the elementary, secondary, normal-school and vocational-school centers of the city. Considerable space will be reserved for commercial exhibits and for the art-in-trade and industry exhibits which are intended to show the direct connection between art, industry, and commerce, and their relation to everyday life. Through a special arrangement with Teachers' College of Columbia University, there will be featured a display of America's contribution to the International Art Congress to be held in Prague. This display will be arranged in a special section, about which all the other exhibits will be artistically grouped. Special attention has been given to lighting and decorative effects in order to carry out the art idea in a show sponsored by an art organization.

The officials of the association have great expectations that this is going to be the best meeting in the history of the organization. All Hartford is making plans to welcome the art teachers. Every teacher who plans to attend the meeting is asked to make early reservations.

Information concerning the meeting may be obtained by writing to Mr. Joseph Wiseltier, chairman of the local committee on arrangements, Hartford, Conn., or to Mr. F. E. Mathewson, secretary, Jersey City, N. J.

THE WESTERN ARTS MEETING

The Western Arts Association will hold its next annual meeting May 2 to 5, at Indianapolis, Ind.

The headquarters for the convention will be in the Claypool Hotel. Reservations may be made direct, or through the chairman of the hotel committee, Miss Laura Holden, 150 N. Meridian St., Indianapolis, Ind.

Mr. Earl Bedell, Detroit, Mich., is chairman of the program committee, and Mr. Harry E. Wood is in charge of the local arrangements for the convention.

In addition to the general program, the meeting will offer a number of round-table conferences for the discussion of problems pertaining to the work of the association.

There will be an exhibit of educational and commercial products in the armory, and in addition, there will be special displays of school products used in the classroom.

Information concerning the meeting may be obtained by writing to Mr. Harry E. Wood, secretary, 5215 College Ave., Indianapolis, Ind., or to Mr. Earl Bedell, Detroit, Mich.

Instructors in metal-working

There are many Stanley Tools for your shop

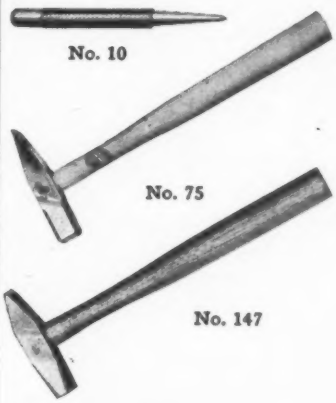
You need durable tools in your shop equipment. Stanley Tools have been known for years as tools of quality and have always been the standard of woodworkers. The tools shown here are a part of the largest line of hand tools on the market today, and should be of utmost interest to you.

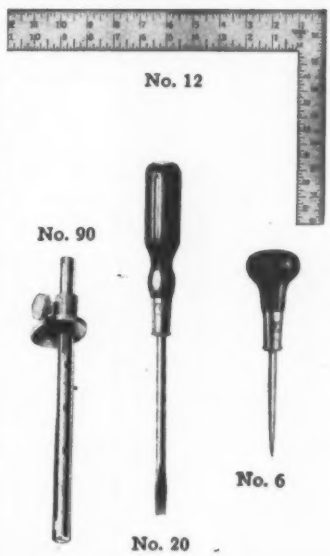
Send for our two catalogs. No. 34g shows the complete line of Stanley Woodworking Tools, Catalog No. 25g shows the complete line of Stanley-Atha Tools, including anvil tools and tongs for the forge shop.

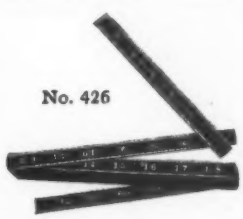
THE STANLEY RULE AND LEVEL PLANT
Educational Department, New Britain, Conn.

STANLEY TOOLS

STANLEY S.W.







What is the "Web" of a twist drill?

And the "Heel" — the "Lips" — the "Body" — and just where is the "Point"? Do you know just what "Lip Clearance" means?

The "HANDBOOK FOR DRILLERS" answers every question the student of modern drilling practice must know. It tells him not only the "How" but—what is more important—the "Why" of the different parts of the twist drill.

Because this booklet is both theoretical and intensely practical, it is being used by hundreds of Vocational, Technical, and High Schools throughout the world as the standard textbook on drilling practice.

The "HANDBOOK" is issued by this Company, not to promote the sale of its products, but to educate prospective and not a few **experienced,** drill users to a better and more intelligent understanding of the twist drill and its use.

Instructors are cordially invited to ask for copies of the "HANDBOOK FOR DRILLERS" in any reasonable quanties free of charge, for the use of their students.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND NEW YORK·CHICAGO·LONDON

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

NEW BOOKS

Bricklaying in Modern Practice

By Stewart Scrimshaw. Cloth, 182 pages, 4¾ by 7¼, illustrated. Price, $1.50. Published by The Macmillan Company, New York.

This is the second reprint of a book which was written by a man who himself had served an apprenticeship in the bricklaying trade and later became supervisor of apprenticeship, under the Industrial Commission. He is, therefore, well fitted for the task of writing a book for the apprentice. A summary at the end of each chapter assists the learner in organizing the subject matter in his own mind and the questions for study and discussion also found at the end of each chapter serve as a check of the learner's knowledge.

The materials, tools, and apparatus, practical work, theoretical information, safety and hygiene of which the bricklayer should have knowledge are discussed, as well as his relation to the public and his fellow worker.

A glossary at the end of the book will be found very helpful. Instructors of apprentices in bricklaying will do well to inspect this book.

The Boy's Busy Book

By Chelsea Fraser. Cloth, 471 pages, 5¼ by 7¾, illustrated. Price, $2.50. Published by Thomas Y. Crowell Company, New York.

This book will be welcomed by every boy who delights in making things. It is well illustrated and its descriptions of tools, materials, and tool processes are simple enough for the average boy. Toys, home comforts, equipment for the porch and yard, apparatus for games, and paraphernalia for boys' sports are all touched upon by the author. This makes an ideal prize for manual-training contests.

Elementary Practical Mechanics

By Joseph M. Jameson. Cloth, 320 pages, 5 by 7½, illustrated. Price, $2.25. Published by John Wiley & Sons, Inc., New York.

The third edition of this well-known textbook, revised and amplified, came off the press in July, 1927. The usual conceptions of force, motion, work, power, and energy, with their practical applications are thoroughly discussed. The chapter on elasticity and strength of materials will be found especially useful by students of machine design. The outlines of review and the problems scattered through the book add materially to its value.

Machine Work

By T. J. Palmateer. Cloth, 202 pages, 5¼ by 7⅜, illustrated. Price, $2.25. Published by Stanford University Press, Stanford University, Calif.

The book is well illustrated. The description of the machine tools are good. The fundamentals in lathe work, drilling, planing, milling, and grinding are treated in Part I of the book, and quantity production is the subject for Part II. This latter portion of the text will be especially interesting and helpful to machine-shop teachers, as it takes up the methods pursued by manufacturers in interchangeable quantity production. The problem chosen is hand-power grinder and all parts, as well as the assembling, are separately discussed.

The English Craft Guilds

Stella Kramer. Cloth, 228 pages. Published by Columbia University Press, New York City.

The subtitle of this book, "Studies in Their Progress and Decline," describes the contents. It takes up in detail (*a*) the amalgamation of the various crafts through the guilds; (*b*) the continual conflicts between the trades and handicrafts, due to economic changes and progress in the trades themselves; and (*c*) the social, political, and economic events and causes which finally led to the end of the guilds. The author sticks closely to facts gleaned from the records of guilds themselves and from other original sources.

Mechanical Pictorial Drawing

By W. W. Sturtevant. Cloth, 128 pages. Price, $1.28. The Bruce Publishing Co., Milwaukee, Wis.

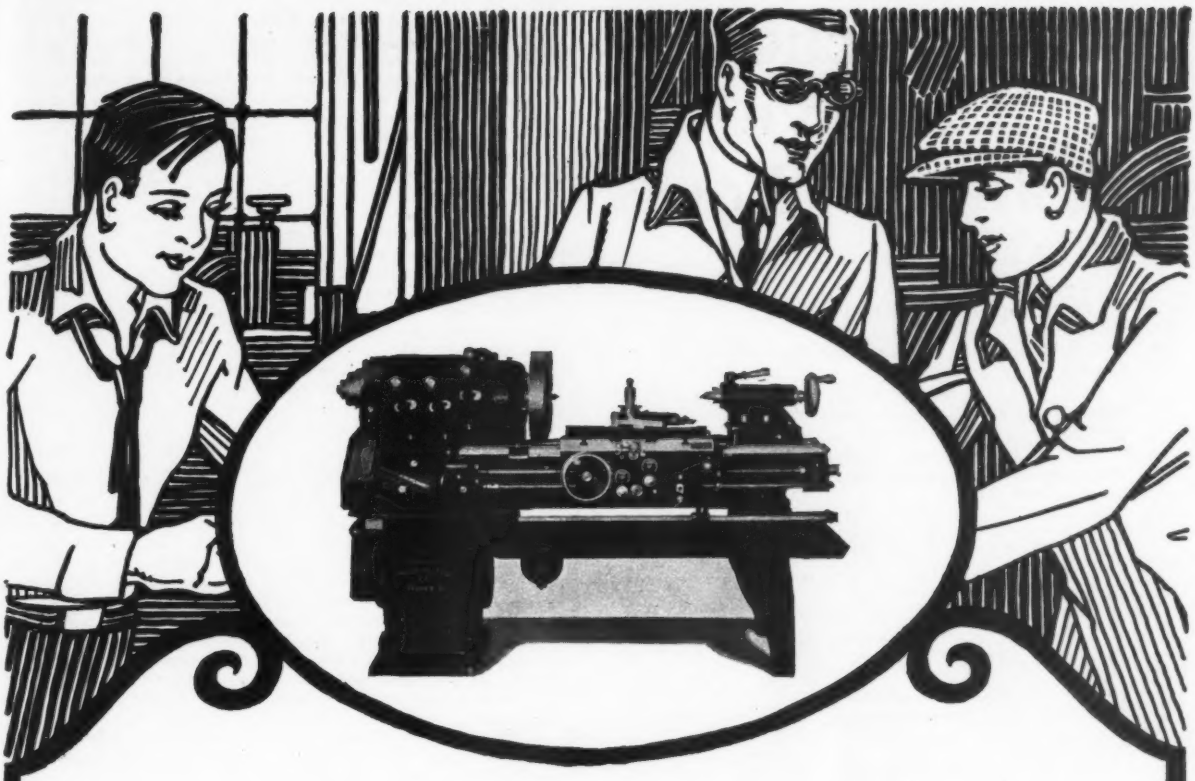
This book outlines the principles of cabinet drawing, isometric drawing, and perspective drawing and illustrates each principle with suitable problems and plates. The work is carefully graded for use in high schools and night classes.

The Tired Child

By Max and Grete Scham. Cloth, 342 pages. Price, $2. J. B. Lippincott Co., Philadelphia, Pa.

This study of fatigue in children is addressed to physicians, educators, and intelligent parents and suggests useful ideas for the prevention and management of chronic fatigue. The authors understand the problem thoroughly from the physician's standpoint, but some of their points-of-view and suggestions will not be so readily accepted by educators and by parents who have the entire mental and spiritual, as well as the physical, regimen of their children's lives well in hand.

Building for Automobile Mechanics. A one-story brick building has been erected at the Township High School at Evanston, Illinois, for the use of the classes in automobile mechanics. The main workshop has a clear space 40 by 70 ft. A chain hoist is provided for lifting heavy parts. At one end is a space 20 by 40 ft., for the toolroom, office, and locker room. There is also a mezzanine floor for blackboard, chairs, and a sectional Buick chassis for demonstration purposes.



Train Your Students for Their Jobs — Use MONARCH LATHES

Train your students on MONARCH LATHES and when they go from your school they will be ready for their jobs —valuable men immediately without the necessity of going through another period of training in the shop.

The student that is trained on a Monarch Lathe is trained in actual shop practice — for the Monarch is the first choice of Industrial America. Today more Monarch Lathes are being sold to industrial plants than any other lathe built.

The Monarch motor-driven, helical geared Lathe is the ideal equipment for instructional purposes. It is far in advance of other lathes in design. It is as near danger-proof as any lathe can be made. It is as noiseless as any lathe can be—an important advantage in the instruction room.

Monarch Lathes are used in the Massachusetts Institute of Technology, Yale, Cornell, and in hundreds of the best technical and high schools — proof that the Monarch is the practical lathe for modern school equipment.

The success of your school and the success of your students are inseparably linked together. Use MONARCH LATHES and meet the modern demand for training that *fits men for their jobs.*

Illustration above shows 14 x 6 helical geared Monarch Lathe

THE MONARCH MACHINE TOOL CO.

100 OAK STREET - - - - - - SIDNEY, OHIO

Good Schools Deserve "Yankee" Tools

"YANKEE" Drills —they work where others can't

Wonderful thing to have tools that will do jobs in the easiest, shortest way!

With the drill on the right, you shift from high speed to slow, at a finger-touch. Avoids jamming in drilling through. Saves drills.

At the left is shown a ratchet drill that drills continuously in tight places where crank can be moved only to and fro.

No. 1435—"Yankee" Hand Drill with Two Speeds, changed instantly without removing drill from work. Length, 11 inches. Weight, 1 lb. 3 oz. Three-jaw chuck. Holds round-shank drills up to ¼ inch.

No. 1530—"Yankee" Ratchet Hand Drill. Five Ratchet Adjustments, including "Yankee" Double Ratchet for continuous drilling in close quarters. Length, 10½ inches. Weight, 1¼ lbs. Three-jaw chuck. Capacity, ¼ inch.

Price $4.50

Price $5.25

Write us for "Yankee" Tool Book, showing all the "Yankee" metal-drilling, wood-boring, and screw-driving tools, free.

TRY THEM

Look for these drills on the "Yankee" Demonstrator, on your hardware dealer's counter. Try them and see how slick they work in your own hands.

"Yankee" on the tool you buy means the utmost in quality, efficiency, and durability.

Dealers Everywhere Sell "Yankee" Tools

Spiral Screw-drivers
Plain Screw-drivers
Ratchet Bit Braces
Automatic Push Drills
Ratchet Breast Drills
Ratchet Tap Wrenches
Automatic Feed
Bench Drills, Vises with removable base, etc.

NORTH BROS. MFG. CO., Philadelphia, U.S.A.

"YANKEE" TOOLS

Make Better Mechanics

PERSONAL NEWS NOTES

Mr. Raymond J. Mahkorn, instructor at the Boys' Technical High School, Milwaukee, Wis., died at Misericordia Hospital on December 3, after a week's illness. Mr. Mahkorn was a graduate of Marquette University and had begun his fourth year at the Technical High School, having received his permanent appointment last June. Mr. Mahkorn is survived by his wife and an infant daughter.

Mr. E. G. Green, formerly a regional executive for the Oklahoma boy scouts' organization, has been elected vocational coordinator for the vocational department of the Oklahoma City schools. Mr. Green will devote his entire time to the work of the part-time schools.

Miss Greta Smith of Denton, Tex., has been appointed director of the mothercraft classes at Oklahoma City, Okla. Miss Smith will be in charge of the classes organized for mothers who need help in home management, home decorating, etc.

Mr. Oliver Osborne, formerly of St. Joseph, Mo., is teaching woodworking at the Roosevelt and Harding Junior High Schools, Oklahoma City, Okla.

Mr. Harry W. McKimmey recently returned to the Central High School, Oklahoma City, Okla., after a year's leave of absence. Mr. McKimmey obtained a leave of absence to teach at the Agricultural and Mechanical College, Stillwater.

Mr. A. W. Hornung, formerly of Oklahoma City, Okla., has become supervisor of manual arts at Wichita Falls, Tex.

Mr. Frederick S. Crispin has been made head of the mechanic-arts department in the Gratz High School, Philadelphia. Mr. Crispin is a graduate of Williamson Trade School, Drexel Institute, and Temple University, and has had considerable teaching experience in the Philadelphia schools. He has had a good deal of practical experience as a machinist and draftsman and enjoys considerable teaching experience in the public schools of Philadelphia.

Mr. Roland Hintz has been appointed head of the manual-arts department at Kaukauna, Wis., to succeed W. T. Sullivan. Mr. Hintz is a graduate of the University of Wisconsin and holds a B. S. degree. Mr. Sullivan, who has become director of the Kaukauna Vocational School, succeeds Mr. A. T. Hudson, who has gone to Kimberly.

Mr. John M. Fecher, formerly principal of the Essex county vocational school at Montclair, N. J., has been appointed as state supervisor of foreman training in the school. Mr. Fecher is a graduate of Pratt Institute and has had wide experience in the industries of New Jersey and New York.

PUBLICATIONS RECEIVED

Paper and School-Supply Facts. By W. J. Pilz. Paper, 10 pages. Issued by the Everett Pulp and Paper Co., Everett, Wash. A booklet of information on paper supplies and paper manufacture, compiled and issued by the Washington Industries Education Bureau under the direction of Clare K. Tripp, director of education.

Flour Facts. By Clare K. Tripp. Paper, 6 pages. A booklet of information on flour compiled by the Fisher Flouring Mills, Harbor Island, Seattle, Wash. The material has been arranged and published for the use of elementary, intermediate, and junior-high-school classes.

Portland Cement. By Clare K. Tripp. Paper, 10 pages. A booklet of information on the organization and operation of the plant of the Olympic Portland Cement Co., Bellingham, Wash. The material has been arranged and published for the use of industrial classes in the schools.

Organization and Operation of a Dyeing and Cleaning Plant. By W. S. Walker. Paper, 11 pages. Compiled and published by the Washington Industries Education Bureau, under the direction of Clare K. Tripp.

Utilization of Water Power and Relation to Industry. By Clare K. Tripp. Paper, 14 pages. Issued by the Washington Industries Education Bureau, under the direction of Clare K. Tripp.

Organization and Operation of a Meat-Packing Plant. By Clare K. Tripp. Paper, 8 pages. Issued by the Washington Industrial Education Bureau, Seattle.

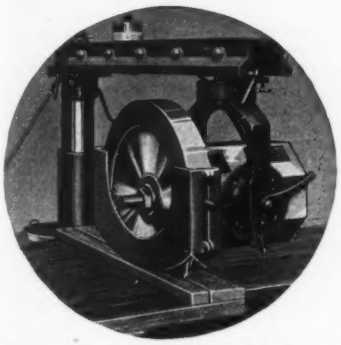
Organization and Operation of a Stove Industry. By Clare K. Tripp. Paper, 8 pages. A description of the product of the Lang Mfg. Co., of Seattle, Wash. Issued by the Washington Industries Education Bureau, Seattle.

Development and Operation of a Modern Coal Mine. By Clare K. Tripp. Paper, 9 pages. A description of the Pacific Coast Coal Company, Seattle, Wash. Issued by the Washington Industries Education Bureau, Seattle.

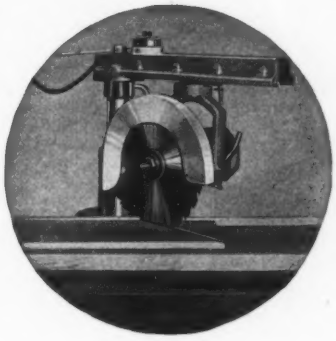
School Printing in the United States. By F. C. Lampe. Paper, 43 pages. A reprint of a series of articles printed in the INDUSTRIAL-ARTS MAGAZINE. The pamphlet traces the early history of printing in the schools, gives the reasons why courses were offered in the schools, outlines the aims of the courses, and the prevailing ideas concerning printing at various times.

The Education of Employed Youth. A report of the proceedings of a special conference on the education of employed youth, held in New York City in May, 1927. Issued by the University of the State of New York, Albany, N. Y.

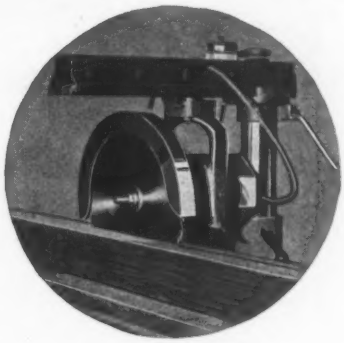
Safe – Accurate – Practical



CROSS-CUTTING WITH SCHOOL GUARD

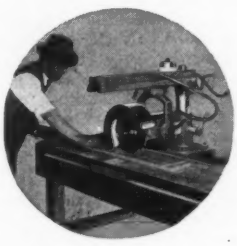


MITERING



RIPPING

Every School Shop Should Have a DeWALT!



PLOUGHING

In selecting a machine for your school shop you want three things above everything else.

First—*Safety*

The simple, rugged construction makes the De Walt in itself a safe machine. But in addition there is a special school guard that provides 100% safety in every cutting position—another guard that removes 90% of the sawdust when machine is ripping—and a special end shield guard that eliminates all possibility of operator's clothing becoming entangled in mandrel shaft.

Second—*Accuracy*

The De Walt has an overhead construction so that the work lies flat with the layout marks always clearly in view. A graduated dial on the side of the machine insures accurate angles on all bevel cuts. A gauge on the arm locates rip distances. A calibrated head locates any miter adjustments with quick locating lugs at 90° and 45°. Every adjustment has a positive locking arrangement.

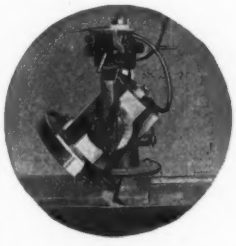
Third—*Practicability*

From the simplest rip or crosscut to the most complicated compound miter cut, the De Walt handles the job with ease. Used in all branches of woodworking—building, planing mills, lumber yards, industrial plants, etc.—the De Walt is the most likely machine your students will find out on the job when they go to work.

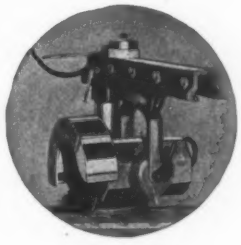
Give your students the unquestioned advantage of learning on a De Walt.

Let us send you complete particulars or arrange for a demonstration of this remarkable all-purpose wood-worker.

SHAPING



BEVEL CROSS-CUTTING



DADOING

A Few of the Schools Now Using De WALTS

Indiana School for Epileptics ..... New Castle, Ind.	Darby High School ..... Darby, Pa.
State College of Washington ..... Pullman, Wash.	Utica Free State Academy ..... Utica, N. Y.
University of Pittsburgh ..... Pittsburgh, Pa.	St. Scholastica Academy ..... Chicago, Ill.
Treddyffrin Easton High School ..... Berwyn, Pa.	Mass. Inst. of Technology ..... Boston, Mass.
State School for Deaf and Dumb ..... Trenton, N. J.	Missionary College ..... Tacoma Park
Hampton Institute ..... Hampton, Va. (2)	Oakdale School ..... Swarthmore, Pa.
Oregon Agricultural College ..... Corvallis, Ore.	Redemptionists' Fathers' School ..... Oakland, Cal.
State Normal School ..... Mansfield, Pa.	Catholic University ..... Washington, D. C.
City of Indianapolis ..... Vocational Depot	Sacred Heart Novitiate ..... Los Gatos, Cal.
State Normal School ..... Bloomsburg, Pa.	L. M. Hartley, Supt. of Indus. Arts ..... Mountain Iron, Minn.
State Normal School ..... Millersville, Pa.	Port Arthur Indp. School Dist. ..... Port Arthur, Tex.
St. George's Parish ..... St. Louis, Mo.	

DE WALT PRODUCTS COMPANY, 614 New Holland Ave., Leola, Penna.

Mail coupon today for full particulars of the

DeWALT

All Purpose WOOD WORKER

DE WALT PRODUCTS CO.
614 New Holland Ave., Leola, Penna.

Please let me know the advantages of the De Walt for our school shop.

Your Name .....

School Name .....

Address .....

A Low-Priced Winner!

One of our best sellers is this No. 220 Mechanical Drawing Table — very roomy and comfortable, with an adjustable top, accommodating six students adequately yet in great compactness.

Just the Table for High Schools

It is a popular table for high school and junior high school use. Six compartments for six pupils—each one containing drawing board, T square, triangles, paper, and instruments—one key only for each pupil.

We are manufacturers of a very complete line of Art and Mechanical Drawing Tables.

Write for our complete Book of Illustrations.

Kewaunee Mfg. Co.
LABORATORY FURNITURE EXPERTS

Designers and Manufacturers of Art and Mechanical Drawing Room Furniture for Schools and Colleges

Kewaunee-Economy Plant No. 2
Adrian, Mich.

Kewaunee

NEWS AND NOTES

TEXAS INDUSTRIAL-ARTS TEACHERS IN ANNUAL SESSION

The industrial-arts section of the Texas Teachers' Association held a meeting on November 24 and 25 at Houston. The first afternoon of the session was devoted to round-table discussions, which centered about high-school accrediting and reorganization of subject matter to meet the needs of modern scientific education.

The second day's sessions were largely attended. Dr. E. E. Oberholtzer of Houston, opened the discussions with an explanation of the practical-arts and vocational program in the city schools. Mr. G. H. Reagan of Dallas, talked on the organization of mechanical-drawing units to meet specific objectives of industrial arts in the high school and the industrial school.

Miss Adelaide Baylor of Washington, D. C., was the principal speaker at the home-economics and industrial-arts sections. Miss Baylor talked about cooperation in the teaching of practical arts. Mr. N. S. Hunsdon, the next speaker, reported on the progress of industrial education in the state during the last year. Mr. J. G. Grove of Commerce, gave a report on the work of the committee which investigated the proposal of establishing a separate trades-and-industry section. The report showed that the members of this section were united in favoring an industrial-education section as part of the state teachers' association, with a joint meeting annually of industrial-arts and trades-and-industry teachers, followed by separate sectional programs for the discussion of problems peculiar to each group.

The Friday afternoon meetings were devoted to two special programs. In the industrial-arts group, problems connected with the introduction of manual training were discussed. A second group reported on the new state accrediting system, while a third group discussed the objectives of manual arts in junior and senior high schools. Dr. F. E. Giesecke gave a talk stressing the contributions which the industrial arts may make toward higher technical education, and suggested changes which might aid in guidance and preparation for such work. Mr. Victor Randell of Huntsville, concluded the program with a report on the preparation of the general-shop teacher.

Mr. Harvey Williams of Austin, who spoke before the trades and industries section, discussed the problems connected with the operation of day trade classes and the testing of results in such schools. Mr. G. B. Trimble of Fort Worth, reported on the accomplishments of the day trade school and suggested a program of activity for this type of school. Mr. H. U. Miles of Edinburg, discussed the vocational program suitable for a small nonindustrial community. The session closed with a discussion of coordination in part-time work.

At the business session, the following officers were elected for the year 1927-28:

President, Mr. E. L. Williams, College Station; vice-president, Mr. G. W. Kibler, Commerce.

Pennsylvania Vocational Association Meets at Lancaster. The Pennsylvania Vocational Association held its annual meeting on December 28 and 29 at Lancaster, Pa. The meeting was given over largely to four round-table sections on agricultural education, continuation schools, home-economics work, and industrial education.

At the agricultural section, Mr. Norman Ratchford of Chester county, talked on "The Importance and Use of Illustrative Material"; Mr. D. L. Crum discussed "Local Project Contests and Project Tours"; Mr. R. E. Sleppy and Mr. C. D. Carey had charge of demonstrations conducted by the boys of the East Cocalico and West Lampeter Vocational Schools.

At the continuation-school section, Mr. W. H. Welsh of Philadelphia, discussed "The Underlying Philosophies in Continuation-School Courses of Study"; Mr. P. L. Cressman of Harrisburg, talked on "Outstanding Accomplishments in Pennsylvania Continuation Schools"; Miss Caroline Reedy of Reading, took for her subject, "Organization of Teaching Material for Continuation Schools."

At the home-economics section, Mrs. C. C. Harrison of Philadelphia, talked on "Girl-Scout Work in Relation to Home Economics"; Miss Amey Watson of Haverford, discussed "Fundamental Problems in Homemaking."

At the industrial-education section, Mr. J. A. McCarthy of Trenton, discussed "The Problem of Part-Time Trade Extension"; Mr. J. E. Wagner of Johnstown, talked on "Day-Unit Trade Classes"; Mr. J. A. Miller of New Kensington, on "Evening Schools"; Mr. Geo. H. Parkes of Williamsport, on "Part-Time Cooperative Courses"; and Mr. G. A. McGarvey of Washington, D. C., took up the subject, "Training for the Industry."

The annual banquet of the association was held at the Stevens House, with Mr. E. R. Gehr of Imperial acting as toastmaster. Mr. G. E. Schulz of Loncaster, talked on "Industry's Interest in Vocational Education"; Mr. A. L. Rowland, of Cheltenham township, discussed "Vocational Education as a School Responsibility."

At the close of the sessions, a short business meeting was held, at which officers for the year were elected.

(Continued on Page 35A)

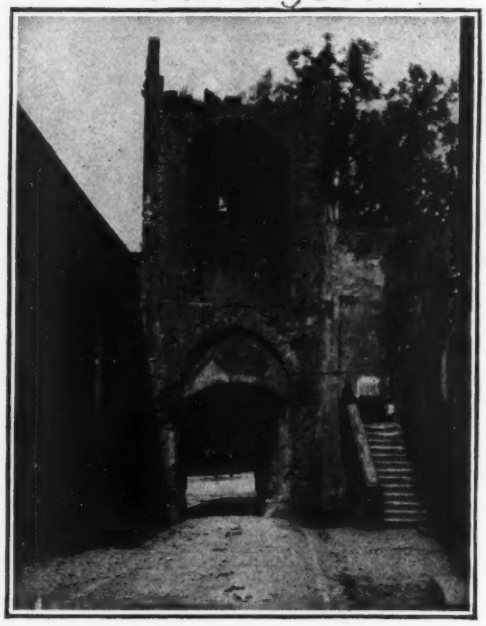
"Old Faithful"
"Prang"
Water Colors
Best
for Schools
More
Brilliant
Smoother
Mix Better
The
AMERICAN
CRAYON CO.
SANDUSKY, O.
NEW YORK
"Old Faithful"
A
SIGN
of
HIGHEST
QUALITY
Prang
Water Colors

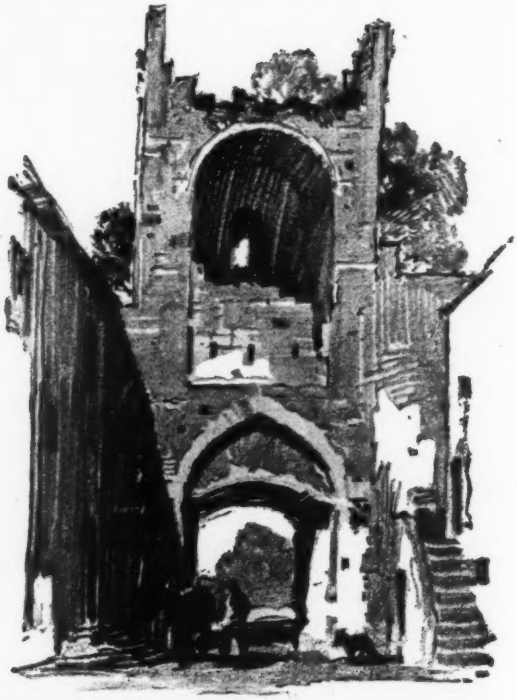
The ELDORADO PAGE

Sketching with The MASTER DRAWING PENCIL

Ernest W. Watson

3 ways of composing this subject





This is one of a series of Pencil Lessons prepared by Ernest W. Watson. Write on your letterhead for samples of Dixon's Eldorado, "The Master Drawing Pencil," Joseph Dixon Crucible Co., Pencil Dept. 128-J, Jersey City, N. J.

(Continued from Page 32A)

Arts-Industrial Section of Eastern Colorado Education Association Holds Meeting. The trades-industrial and arts-industrial sections of the Eastern Colorado Education Association met at the Brown Palace Hotel, Denver, on November 10.

Dr. S. J. Vaughn, president of the Colorado Woman's College, was one of the speakers. Dr. Vaughn who talked on the subject, "Better Teaching Methods," reviewed the development of manual training, art, home economics, and other vocational subjects in the last twenty years. He pointed out the change in objectives and emphasized the need of a broader educational background for the trade teacher, pointing out that the lack of a knowledge of the principles of teaching is as great a handicap to the teacher as a lack of knowledge of his trade. Dr. Vaughn emphasized the fact that courses should be adapted to the capacity, the ability, and the needs of the individual student. Broad backgrounds of related material should be established, the historical background of the subject should be emphasized, and standards should be set up for measuring the work.

Dr. C. A. Prosser, of Minneapolis, who spoke following the luncheon, talked on "The Need of a Knowledge of Teaching Principles."

The arts-industrial section held its meeting in the House of Representatives on November 11. Mr. R. Ewing Stiffler, Denver, spoke on "The Value of Teaching Art to Industry." Miss Nina Carey, speaking on "Better Methods in Art," outlined the necessity for teaching that type of art which is comprehended by the general public, thereby arousing more interest in the various phases of art. Better teaching methods in the shops were discussed by Mr. David Evans, Mr. H. A. England, and Mr. Waldo Miller. The speakers all stressed the development of the child through better teaching procedure.

Seattle Organizes Vocational Group. The Seattle Vocational Guidance Association was organized on December 8, when a large group of men and women representing the schools and other local agencies met at a conference.

A number of those present gave talks showing the need for an organization of this character. Mr. Donald Stewart of the Pacific Northwest Products Association stated that there were fifty-two firms in the city engaged in the garment-making industry, and yet few of these have any knowledge of the training being given in the public schools. Mr. W. S. Johnson spoke of the need for good original designers for the garment factories, and Mr. E. C. Alt spoke on the apprenticeship system in operation in the merchant tailors' trade.

The meeting closed with the election of the following officers:

President, Mr. S. E. Fleming; vice-president, Mr. Harry Cunningham; secretary, Miss Nina Winn; treasurer, Mr. E. C. Alt.

Iowa Industrial-Arts Teachers Elect New Officers. The Iowa Association of Industrial-Arts Teachers held their annual meeting in November. The following officers were elected for the ensuing year: President, Mr. F. J. Schmidt, Boxholm; secretary, Mr. H. W. Carmichael, Des Moines; treasurer, Mr. J. L. Jones, Des Moines.

Bristol Agricultural School Offers Special Courses. The Bristol County Agricultural School, Segreganset, Massachusetts, offers a number of special two- and three-year courses for pupils whose education, farm experience, and general ability enable them to carry the work satisfactorily. Those who complete the required work in a high-school agricultural department are permitted to graduate from the school in two years and receive a diploma.

During the six months from April 1 to October 1 of each year, instruction is largely informal and is given in barns, shop, or on the farm, where the instructors and students participate in the regular farming operations. The courses are not intended to fit young men for college entrance, but arrangements may be made so that any student who has completed four years of creditable work with a satisfactory grade, may be certified for admittance into the Massachusetts Agricultural College, without examination, for a regular four-year course.

Students Take Vocational Work in Industrial Plants. Four high-school students at Red Wing, Minn., have entered upon a co-operative vocational course. The students spend one-half day in school and devote the remainder to work in a shop of their own selection. A shoe shop and three automobile plants represent the plants selected by the students for their practical work.

A new study in occupations has been included in the vocational courses. The course offers the student valuable information regarding the trades and professions making it possible for him to make a wise choice of a vocation.

Utica Students Undertake Home Building. The construction of homes has been undertaken by the trades classes in the technical and vocational departments at Utica, N. Y. During the past year the boys completed the erection of an eight-room house.

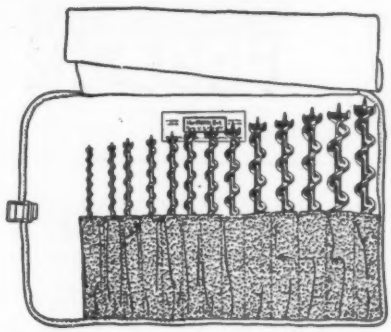
The boys spend half their time on the job and the remainder of the time is given to classwork. The houses are built for a private owner who provides the lot, the supplies, and materials. They are paid a small fee, which is equal to a percentage on the total cost of the job, and the money goes into an equipment fund.

(Continued on Page 38A)

special

IRWIN CABINET SET FOR VOCATIONAL AND MANUAL TRAINING INSTRUCTORS AND STUDENTS

13 BITS — STYLE 62 TS



These are the kind of bits the fine cabinet maker uses. They were built for just such work. The screw is pitched to feed at just the right speed for best work. Spurs and Cutters, in fact, the entire cutting heads are specially designed to meet the conditions of vocational education work with its variety of materials. The set includes Irwin Smoothbor Auger Bits in sizes 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, and 16/16ths—Total 32½ Quarters—13 Sizes.

This Irwin Cabinet Set

May be had in either Borkit No. DSR or Borcase No. DS. This arrangement gives an instructor the opportunity of explaining the use of bits, the sizes to use on different work, and it also keeps bits together in better order and condition.

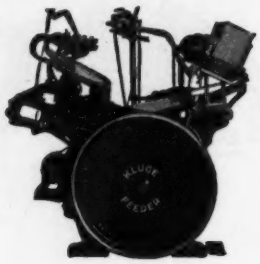
Irwin Cooperation for Instructors

We will be glad to send on request to any students or classes our book "How to Select, Use and Care for Bits." We also have a limited number of demonstration panels showing how bits are manufactured. These panels are available at times for school use. Write us about them.

IRWIN AUGER BIT COMPANY

WILMINGTON, OHIO.

IRWIN Auger Bits



WHEREVER
A PLATEN PRESS
IS USED —

the necessity for a KLUGE FEEDER becomes immediately apparent; not only to release a busy man from the drudgery of hand-feeding, but also to enable the press to attain maximum production at a minimum of cost. Every student-printer who acquires his technical training with the help of a KLUGE FEEDER is a better business man from the start.

The KLUGE
AUTOMATIC JOB PRESS
FEEDER

Brandtjen & Kluge Inc.
Office and Factory: 310-312 Cedar St.
Saint Paul, Minnesota.
New York, Detroit, Chicago, St. Louis, Dallas, Atlanta, San Francisco.

Instructors, Supervisors, and Superintendents should write for a class supply of our descriptive booklet "Let Merit Decide."

SCHOOL SHOP EQUIPMENT NEWS

For the Supervisor and Teacher who desires to keep abreast with news of new Machinery, Tools, Supplies, etc.

NEW PEXTO COMBINATION ROTARY BENCH MACHINE

The Peck, Stow & Wilcox Company of Southington, Conn., has issued its new booklet No. 45, which illustrates and describes the Pexto universal combination rotary bench machine recently placed on the market.

The machine will be found very useful as it will take care of all turning, wiring, burring, and elbow-edging operations. The machine is well constructed, is provided with interchangeable rolls, and takes care of a variety of operations without the sacrifice of any individual

features. With the interchangeable feature, the rolls may be used with any number of machines in use in the shop.

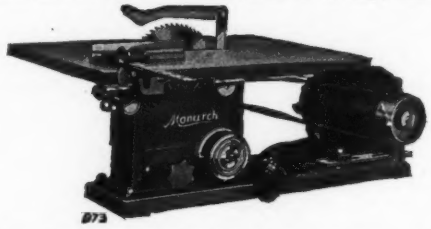
In its construction, the machine retains the five original Pexto features, namely: an adjustable steel crank offering short or long leverage; adjustable crank for upper or lower shaft, offering needed variance in drives either forward or reverse; a two-in-one general-purpose micrometer gauge with lock nut permitting the transfer of the gauge to the rear or front of the frame; key-seated, countersunk rolls, which are held to shafts with screw nuts in place of the former method of locking gears; a two-piece crank screw, by which the position of the crank can be changed for use with large work when there is difficulty in passing the work through the rolls.

The Peck, Stow & Wilcox Company maintains a school-equipment news section and will be glad to send descriptive information to any school-shop instructor who will address the firm at Southington, Conn.

NEW MONARCH BALL-BEARING BENCH SAW

The American Saw Mill Machinery Company of Hackettstown, N. J., has announced the marketing of its Monarch ball-bearing bench saw, which is intended for general use in the woodworking shop.

The Monarch bench saw has a solid-cast table, 18 by 24 in. in size, which may be tilted to any angle up to 45 deg., and which is



operated by a handwheel at the side of the pedestal. The saw is raised and lowered by means of another handwheel, which is located at the side of the pedestal. The raising and lowering device operates through bevel gears and screw, which provide accurate setting to regulate the depth in grooving or rabbeting work. The table has a rise and fall of 2¼ in., and the saw is a combination rip and cut-off saw, 8 in. in diameter.

The table is provided with a combination rip and cut-off gauge. When used as a ripping gauge, the slide head is locked and the fence is swung around to the 90-deg. position and locked. There is adjustment for accurate alignment with the saw. When used as a cut-off gauge, the slide head is released, and the gauge moves on the table, guided by a steel bar to which the slide head is gibbed.

PRINT SHOP OF PORTOLA JUNIOR HIGH SCHOOL, SAN FRANCISCO, CAL.

In this illustration is shown the American School Type Cabinet which is recommended for use in School Printing Equipments. It is of cabinet construction, with case brackets, steel case slides (not wood) and legs which may be cut off, if desired, to adapt the cabinet to the correct height for the individual student.

and now it is Printing in the Junior High School

IN the past two years San Francisco has installed eight school printing outfits in her schools, most of them in the Junior High Schools. Having started with the installation of one school printing outfit, it is only logical to believe that educational benefits derived from the first outfit justified the installation of the other print shops.

Printing is educational. As an accessory subject in the teaching of those subjects that have a cultural objective it is unsurpassed.

English and its allied branches, as well as arithmetic and art, are easily coördinated with Printing. The romantic history and the parallel growth of Printing with civilization make it a logical subject to be taught in education.

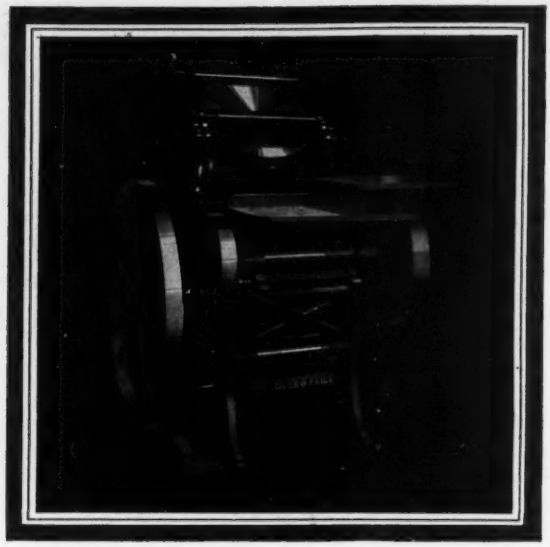
Hundreds of schools are installing printing —why not install printing in your schools?

Write today for information concerning the proper size outfit, the educational value of the subject, the qualifications of the successful teacher, or any other information you may desire concerning that most popular subject—PRINTING. *Suggestions for practical outfits for any type of school, located in any community—country, suburban, or city—will be sent upon request.*

F. K. PHILLIPS, *Manager,* EDUCATION DEPARTMENT

American Type Founders Company

300 Communipaw Avenue, JERSEY CITY, N. J.



THE business man of tomorrow will give more and more thought to his company forms—his personal and business stationery—to his advertising—to every form of printed matter that represents himself in his active daily sphere.

This business man of tomorrow is being trained in the schools of today to become an intelligent adult consumer of printed matter. Chandler & Price Presses are helping to instill in him the fundamentals of good taste. Through their work, he is growing used to the value of mottoes, of school booklets, of school papers, of printed matter in a thousand forms.

All this looks to an actual increase in the consumption of printed matter by the next generation, as well as to a subtle and sure heightening of its tone.

Chandler & Price Presses have been privileged thus to aid materially and practically in today's educational systems. We should be glad to discuss your present requirements.

Chandler & Price
PRESSES & PAPER CUTTERS

The Chandler & Price Company

Cleveland, Ohio, U. S. A.

PrintingInstructors

Send to us or any dealer in Printers' Supplies for literature on any of the following machines and utilities, in use throughout the World:

Lee Two-Revolution Cylinder Presses
Diamond Power and Lever Paper Cutters
Advance Lever Paper Cutters
Hoerner Combination Type-High Machine
Sieber Adjustable Hand Punch
Challenge Proof Presses
McGreal Combination Printers' Chases
Challenge Labor-Saving Iron Furniture
Challenge Mammoth Iron Furniture
Challenge Notched Iron Furniture
Challenge Semi-Steel Imposing Surfaces
Challenge Pressed Steel Galleys
Challenge Rigid Rim Galleys
Challenge Iron Sectional Blocks and Hooks
Challenge Type-High Gauges
Challenge Quoins and Keys

Our Magazine "The Printers' Album" sent gratis — Ask for it

The Challenge Machinery Co.
Grand Haven, Michigan
Chicago, 17-19 E. Austin Ave. **New York, 220 W. 19th St.**

(Continued from Page 35A)

New Bedford Textile School. The regular day classes of the New Bedford, Massachusetts, Textile School comprise: Cotton manufacturing, chemistry, dyeing and finishing, designing, carding and spinning, hosiery knitting, and latch-needle underwear knitting.

The courses are three years in length and are intended to qualify students to hold positions of responsibility in the textile manufacturing and allied industries.

Training for Farming and Homemaking in Wisconsin. The State of Wisconsin is training approximately 25,000 boys and girls in the arts of farming and homemaking through the operation of 4-H clubs in the state. These 25,000 young people are members of dairy, beef, pig, poultry, garden, sewing, canning, baking, crops, and forestry clubs. Each member takes part in one or more projects in farming, gardening, or homemaking, under the direction of local leaders and keeps records of all the work done. The farmers of the vicinity have assisted in the work by serving as local leaders of the clubs, guiding the young people in their work, and adding their years of experience to the leadership. In three centers of the state a scholarship is awarded each year to the short course in agriculture at the state university.

Miami Opportunity School. The Miami Opportunity School Miami, Florida, opened for its third year in September. The school which has proved an interesting educational experiment in Miami, is quite unusual in its plan of organization and administration. It was established to assist young people to fit themselves by education and training to a proper life adjustment. The school acts as a first-aid station near the firing lines of business and industry, and students are permitted to arrange their work according to their time, ability, and needs. The school offers a wide range of courses and all students, 16 years or over, are eligible to attend. Among the new courses offered this year are costume designing, commercial art, public speaking, Spanish, and commercial work.

St. Louis Vocational School. The St. Louis Vocational School is at present located in the Central High School. The school offers subjects and trades other than commercial education and is under the direction of Mr. T. E. Spencer.

Evening Classes in Sheet-Metal Work at St. Louis. The evening school at St. Louis, Mo., is offering courses in sheet-metal work for apprentices in the trade, and pattern drafting for garment workers. Mr. F. W. Hebberger is in charge of the program in evening classes.